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ABSTRACT

This study presents and discusses existing data on disability by state, from the 1980 and 1990 censuses, the Current Population Survey (CPS), and the National Health Interview Survey (NHIS). The study used direct methods for states with large sample sizes and synthetic estimates for states with low sample sizes. The study's highlighted findings include: (1) states differ substantially in the rate and severity of work disability (7 of the 10 states with the highest rates of work disability are in the South); (2) an adult in West Virginia is 3.6 times as likely as one in Alaska to be prevented from working; (3) the CPS generates estimates with consistently greater accuracy than the NHIS (as compared to 1990 census values); (4) increased rate of high school completion are associated with declines in work disability; (5) an adult in Mississippi is three times as likely as one in Alaska to have difficulty in mobility or self care; and (6) the rate of work disability declined nationally, from 85.2 per thousand in 1980 to 81.5 per thousand people aged 16 to 64 years in 1990. Extensive tables and figures illustrate and detail the study's findings. (Contains 37 references.) (DB)

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REPORT 3

Disability Statistics Report

State Estimates of Disability in America

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STATE ESTIMATES OF DISABILITY IN AMERICA

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INTRODUCTION

Disability is highly related to socioeconomic, cultural, and environmental conditions. The 50 states and the District of Columbia differ widely in the wealth, educational attainment, racial and ethnic composition, and social beliefs of their populations, and in the built and natural physical environment. In response to some of these differences, the rate of disability can be expected to vary by region and from state to state. In fact, a "disability belt" runs through Appalachia and the Mississippi Valley with the highest rates of Social Security disability beneficiaries in the country (McCoy & Weems, 1989), but this finding is restricted to a narrow definition of severe disability occurring only among people of working ages. To develop an understanding of the range of variation in disability across state populations, accurate statistical data based on broad population measures of disability are required.

Recent developments in national policy provide cause for considering variation in disability among the states. Public Law 101-336, The Americans with Disabilities Act (ADA), enacted July 26, 1990, provides broad civil rights protections and equality of opportunity to people with disabilities. The ADA will become fully implemented by July 26, 1994 and will impact many sectors of American society, including state government and business. Health care, transportation, communication, public services, and public facilities must accommodate people with disabilities. The Fair Housing Amendments Act of 1988, Public Law 100-430, requires that all new multifamily housing be accessible and existing dwellings be adaptable (West, 1991). The Act authorizes the Secretary of the Department of Housing and Urban Development (HUD) to investigate and resolve complaints of discriminatory housing practices, and civil penalties may be imposed. Implementation of the ADA and the Fair Housing Act will be aided by accurate statistical information on disability in the states.

Public Law 100-407, The Technology-Related Assistance for Individuals with Disabilities Act of 1988 (the "Tech Act"), authorizes federal funds to states to plan and develop consumer-responsive, comprehensive statewide programs of technology-related assistance for individuals with functional deficits or disabilities. These goals can be achieved by providing assistive technology devices and services, developing an information dissemination system, establishing or enhancing training and technical assistance, and designing public awareness projects. The Tech Act recognizes the need for concerted planning to increase access to technology for people with functional deficits. Statistics on the number of people with disabilities and rates for the states can assist state governments in planning such projects.

Statistical data on disability from the 1980 census has been used in allocating funds for state vocational education and rehabilitation programs, employment programs, transit systems, and programs for elderly people with special needs (U.S. Bureau of the Census, 1990). In recent years, declining federal funding has shifted more of the burden of governing to the states, contributing to greater variation in state programs and operations (Council of State Governments, 1990). Accurate state data for disability on non-census years may permit allocations for a variety of programs serving people with disabilities to be made more efficiently. A variety of other federal and state programs have been established that would benefit from annual statistics on disability for the states.

Several sources of data exist on disability for the states, including the decennial censuses and two large national household samples, but they differ in accuracy, precision, disability content, and frequency. Accuracy refers to how congruent estimates are with "true" population values. Two sources of inaccuracy occur: nonsampling and sampling error. Sampling error occurs because the estimate is derived from a sample rather than a complete census of the population. An estimate having low sampling error is precise, but may be inaccurate if nonsampling error is significant. Nonsampling error can be due to many sources including vagueness in

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definitions, imprecise wording or interpretation of questions or even their position in the questionnaire; recall error, incorrect response, and errors made in collecting and processing data; and in estimation (Kish, 1965).

The census is the most precise source of state data. The 1980 and 1990 censuses provide estimates on work disability in the 50 states and the District of Columbia (hereafter called the "states"), and the 1990 census also provides estimates of difficulty in mobility and self-care activities for the states. Disability in childhood is not covered in the decennial census. If free of nonsampling error, the decennial census should measure actual population values. The disability measures used in the census have been found to be statistically reliable (McNeil, 1986; U.S. Bureau of the Census, 1990), but issues of definition are also important.

The Current Population Survey (CPS) and the National Health Interview Survey (NHIS) are the nation's two largest surveys. The CPS is designed to provide state statistics, but is less precise than the census. For a sample to represent the states well and still employ an efficient sample (a minimum sample size for a specified level of precision), it must be designed with that aim in mind. The CPS uses special procedures to ensure that state samples achieve a minimum level of precision for estimates of labor force characteristics of the states. The CPS covers limitations in the work role and is conducted continuously, but has not been used to develop estimates of work disability for the states.

The NHIS is conducted continuously and provides a measure of disability that covers a variety of socially structured activities in addition to major roles in all age groups. The NHIS is designed as a national survey, with a sample that is efficient for providing national health estimates and cannot be expected to produce estimates for the states with the same accuracy as the CPS. Both surveys can generate annual estimates of disability for states, but the accuracy and precision of the estimates need to be evaluated.

This study presents and discusses existing data on disability from the 1980 and 1990 censuses, presents new estimates from the 1990 CPS and the 1990 NHIS, and evaluates their accuracy and precision. Due to differences in the sample designs, it is expected that the 1990 CPS estimates should be closer to 1990 census values than are 1990 NHIS estimates. The study relies on "direct estimation" rather than "synthetic estimation." Direct estimates are those produced entirely from a survey without relying on external information—it is the traditional method of estimation using national surveys, usually by summing or averaging sample observations weighted by the inverse of their probability of being selected into the sample. Direct estimation for states requires that sampled individuals can be identified by state.

Synthetic estimation has been developed as an alternative procedure when the sample size or design is inadequate to make precise direct estimates for states or when sampled individuals cannot be identified by state. In this approach, it is assumed that states vary principally as a result of differences in their demographic composition, usually age, gender, and race. Though the NHIS has been used to produce synthetic estimates of disability for states, the accuracy of such estimates is controversial (National Center for Health Statistics, 1978; Newacheck, 1991). The rate of disability may vary by state because of many factors in addition to age, gender, and race, and large errors may occur in synthetic estimates if these other factors are not measured. Synthetic estimates based only on age and gender typically underestimate the true variation across states because the states vary little by these measures.

For example, in a recent study that produced synthetic state estimates from the NHIS based on age and gender (Interagency Forum on Aging-Related Statistics, 1992), the percent of the population aged 65 and over in perceived excellent health ranged from 15.8 to 16.2 percent, with most states clustered at the national value of 15.9 percent. It is highly unlikely that the true variation across states in the percent of the older population who perceive their health as excellent is so narrow.

Direct and synthetic methods have been combined, using direct estimates for states with large sample sizes but relying more on synthetic estimates for states with low sample sizes, an approach that has been termed "composite estimation" (National Center for Health Statistics, 1978; Schaible, Brock, Casady, & Schnack, 1979). The approach of the present study is to evaluate the accuracy and precision of direct survey estimates and compare them with 1990 census values on similar measures.

HIGHLIGHTS

- States differ substantially in the rate and severity of work disability. Seven of the ten states with the highest rates of work disability are in the South.
- An adult in West Virginia is twice as likely as one in New Jersey to have a work disability.
- An adult in West Virginia is 3.6 times as likely as one in Alaska to be prevented from working.
- From 1980 to 1990, the rate of work disability declined in southern states but increased for midwestern and western states.
- An adult in Mississippi is three times as likely as one in Alaska to have difficulty in mobility or self-care.
- An elderly person in Mississippi is twice as likely as one in South Dakota to have difficulty in mobility or self-care.
- The Current Population Survey (CPS) generates estimates of state characteristics with consistently greater accuracy than the National Health Interview Survey (NHIS) as compared to 1990 census values.
- State estimates of the rate of severe work disability from the 1990 CPS and from the 1988-90 NHIS are highly associated with 1990 census estimates, suggesting that the two surveys can provide intercensal estimates with some accuracy.
- State estimates from the 1988-90 NHIS of the rate of activity limitation, a broad measure of disability applicable to all age groups, also show significant state variation and are moderately associated with 1990 census rates of work disability. A person in Mississippi is about 2.8 times as likely as one in Wyoming to be limited in major activity.
- Increased rates of high school completion in the states are associated with the decline in work disability from 1980 to 1990.

STATISTICAL DATA SOURCES AND METHODS

DEFINITION, MEASUREMENT, AND ESTIMATION OF DISABILITY

A person with a disability is defined as one with a limitation in actions or activities because of a mental, physical, or emotional health condition (LaPlante, 1991a). Limitations in *action* range from relatively minor limitations, such as difficulty seeing at night to relatively major ones, such as total blindness. Limitations in *activity* also range from relatively minor limitations, such as not being able to drive at night to relatively major ones, such as being unable to work or needing assistance from another person in self-care activities. *Activities* are complex behaviors that can be decomposed into basic *actions*. The activity of driving a car involves such actions as seeing, hearing, gripping and pulling with arms and hands, and pushing and lifting with legs and feet. The distinction between actions and activities is useful since some actions may be modified to prevent limitation in activities. For example, technology that enables a person who cannot use his or her legs to use only his or her arms to control the functions of accelerating or braking prevents limitation in the activity of driving a car. Such a person may still be considered as having a disability, but the disability is less severe than it would be if the technology were unavailable.

Legislation such as the ADA and the Tech Act addresses disability throughout a broad continuum with both general and specific measurements of disability needed in various dimensions. The full range of actions and activities and the level of limitation need to be measured for all age groups. The Sickness Impact Profile (Bergner, Bobbitt, Kressel, Pollard, Gilson, & Morris, 1976) is an example of a comprehensive measure containing over 136 items, including a wide range of action and activity items. Although it has not been used in national data collection on disability, it has been employed in community surveys (Patrick, 1989).

In the census, the CPS, and the NHIS, disability is measured by whether a chronic health problem causes difficulty or limitation in activities that people are generally expected to perform. Disability has a normative dimension and is self-reported or reported by a proxy respondent. The level of limitation in activity is measured in terms of difficulty or inability. Often, only inability is measured, resulting in the full magnitude of disability being underrepresented in the population (Verbrugge, 1990). Measurements of disability in the data sets used in this study all fall within this definitional model, though they concentrate on different aspects and focus on different measures and levels. Nevertheless, the data sets have much in common affording some opportunity for comparison.

Information on disability is included in the decennial census long form, sent to a sample of one in six households in both 1980 and 1990. The 1990 census provides direct counts of people with work, mobility, or self-care disability for states, counties, cities and other substate areas and has negligible sampling error. The 1990 census (Table A) measures work disability, due to a physical, mental, or other health condition that has lasted at least six months, in the following categories: 1. limitation in the kind or amount of work a person can do (nonsevere work disability); 2. prevention from working at a job (severe work disability); and 3. any work disability (either 1 or 2). Each person aged 15 and older in the household is covered. The long form can be filled out by all members of the household or by one member acting on behalf of other household members. It is not known to what extent proxy responses occur, which could impact disability measurement. Questions on work disability asked in the 1990 census are identical to those asked in 1980 and provide a measure of change over a decade.

Disability is not measured comprehensively in either the 1980 or 1990 census. One omission is that disability is not measured for children. Four measures of disability were tested for inclusion in the 1990 census but were found to have low test-retest reliability or high nonresponse and were not included in the census. These measures were chronic conditions (regardless of disability), main condition causing limitation, being prevented from driving, and activity limitation in children (U.S. Bureau of the Census, 1990). However, a two-part question on difficulty in outside mobility (any difficulty going outside the home alone) and difficulty in self-care (any difficulty taking care of personal needs, such as bathing, dressing, or getting about inside the home) was found sufficiently reliable and was added to the 1990 census. This information was collected for all people aged 15 and older (Table B). State data from the 1990 census on work disability and on difficulty in outside mobility and self-care are presented in this report for people aged 16 and older.

CENSUS AND SURVEY MEASURES OF DISABILITY COMPARED

A substantive advantage to the NHIS is the broad measurement of disability it provides, including recreational and community activities and activity limitations in children. The NHIS measure of activity limitation covers all age groups, and classifies activities by major roles appropriate to particular age groups, including play for infants, school for children, work or housework for adults aged 18 to 69, and basic life activities for people aged 70 and over. A residual category includes "limitations in any activities in any way." It is estimated that 33.8 million people of all ages living in households in the United States had a limitation in activity in 1990, or 13.7 percent of the household population (Adams & Benson, 1991). About 22.9 million people were limited in major activity, and 10.9 million were limited in nonmajor activity. There is no equivalent measure in the census or the CPS.

The NHIS employs a two-part question on work disability that is similar in wording to the census question (Table A). In the decennial census, however, work disability is restricted to health conditions of 6 or more months duration. In the NHIS, the restriction is three or more months duration (not part of the work disability question, but based on duration information collected elsewhere in the questionnaire). The basic CPS question

on work disability is (Table A, Item A): Does anyone in this household have a health problem or disability which prevents them from working or limits the kind or amount of work they can do? This question is phrased similarly to the decennial census and NHIS question but is not asked in two parts, so work prevention cannot be distinguished from nonsevere work limitation. Also, there is no duration restriction. The inclusion in the CPS of people who have temporary disabilities, such as disabilities caused by most injuries, tends to inflate CPS estimates of work disability.

Table A. Operational Definitions of Work Disability in the 1990 Census, the 1990 Current Population Survey (CPS), and the 1990 National Health Interview Survey (NHIS)

1990 Census		Measure	Screen	Age Group
		Does this person have a physical, mental, or other health condition that has lasted for 6 or more months and which —		
1 Nonsevere work disability		Limits the kind or amount of work this person can do at a job? (Q. 18a)	Person	15+
2 Severe work disability		Prevents this person from working at a job? (Q. 18b)	Person	15+
3 Any work disability		1 or 2	Person	15+
1990 CPS March Income Supplement				
		Measure		
1 Any work disability	A	Does anyone in this household have a health problem or disability which prevents them from working or which limits the kind or amount of work they can do? (Q. 62A)	Household	14+
	or B	Did anyone in the household receive SSI payments, that is Supplemental Security Income? (Q. 57A)	Household	14+
	or C	Did anyone in the household receive Medicare (for the disabled and elderly)? (Q. 74A)	Household	14+
	or D	If person was not working at a job, or doing housework, or going to school most of the week prior to interview were they unable to work? (Q. 19 on basic questionnaire)	Person	14+
	or E	If person did not work at a job or business in the previous year (Q. 29A) was the main reason that -- was ill or disabled and unable to work? (Q. 32)	Person	14+
	or F	Is there anyone in this household who ever retired or left a job for health reasons? (Q. 63A)	Household	14+
2 Severe work disability		same as B-E above	Combination	14+
3 Nonsevere work disability		residual of 1 minus 2	Combination	14+
1990 NHIS		**Measure**		
1 Severe work disability		Does any impairment or health problem NOW keep -- from working at a job or business? (Q. B.2a)	Person	16-69
2 Nonsevere work disability		Is -- limited in the kind OR amount of work -- can do because of any impairment or health problem? (Q. B.2b)	Person	16-69
3 Any work disability		1 or 2	Person	16-69

Table B. Operational Definitions of Disability in Basic Life Activities in the 1990 Census and the 1990 National Health Interview Survey

1990 Census	Measure	Screen	Age group
	Because of a health condition that has lasted for 6 or more months, does this person have any difficulty —		
1 Outside mobility difficulty	Going outside the home alone, for example, to shop or visit a doctor's office? (Q. 19a, persons aged 16 and over)	Person	15+
2 Selfcare (ADL) difficulty	Taking care of his or her own personal needs, such as bathing, dressing, or getting around inside the home? (Q. 19b, persons aged 16 and over)	Person	15+
3 Mobility/self care difficulty	1 or 2	Person	15+
1990 NHIS	**Measure**		
1 Assistance needed in self care (ADL)	Because of any impairment or health problem, does -- need the help of other persons with -- personal care needs, such as eating, bathing, dressing, or getting around this home? (Q. B.9a, B.14a)	Person	5+
2 Assistance needed in IADL	Because of any impairment or health problem, does -- need the help of other persons in handling -- routine needs, such as everyday household chores, doing necessary business, shopping, or getting around for other purposes? (Q. B.9b, B.14b)	Person	18+
3 Any assistance	1 or 2	Person	5+

The NHIS estimates exclude people with disabilities caused by conditions of less than three months' duration. In the 1970 census, a question about the duration of work disability was included (but omitted in the 1990 census), and for about 1.1 million out of the 12.1 million people (or about 9 percent) with a work disability, their disability had lasted for less than 6 months. About the same percentage was obtained, regardless of the severity of the disability. The question used in the CPS would thus be expected to yield a substantially higher estimate of the number of people with work disability than the 1990 census, and a somewhat higher estimate than the NHIS.

From the basic CPS question, 10.8 million people aged 16 to 64 had a work disability in 1990, compared to 12.9 million from the 1990 census, and 14.1 million from the 1990 NHIS. Unexpectedly, the CPS estimate is lower than the census and NHIS estimates. One possible explanation is that the CPS uses a household screen format (i.e., asking whether anyone in the household has a work disability rather than asking specifically about each member of the household as in the decennial census and the NHIS), which may cause the CPS to undercount people with work disabilities (Bennefield, McNeil & United States Bureau of the Census, 1989), particularly those whose limitations are less severe. Nonsevere work disability may be less obvious to a respondent who answers for others in the household.

ADJUSTING CPS ESTIMATES FOR SEVERITY

Because the basic work disability question in the CPS cannot be disaggregated by severity, the Bureau of the Census uses a multi-step method of estimating the severity of work disability. The estimate is based on program participation and work history information collected elsewhere in the survey (Bennefield et al., 1989): If an adult under age 65 is receiving Supplemental Security Income (SSI) or Medicare, it is assumed that person is severely limited in work (Table A, Items B, C). This is appropriate because eligibility rules for these programs require medical certification of severe disability and most beneficiaries are in fact unable to work, though a small number may work under current rules. People who did not work at all in the previous year or were not working during the survey week because of a disability are also categorized by the Bureau as having a severe work disability (Items D, E). These latter items are asked of each person in the household (not through a household screen) and may pick up some individuals that the basic question fails to identify. Thus, estimates of severe work disability are less affected by the household screen than estimates of nonsevere work disability.

The Bureau's official 1990 CPS estimate is 7.9 million people aged 16 to 64 with a severe work disability (McNeil, Bennefield & United States Bureau of the Census, 1991). The Bureau's adjustment picks up some additional individuals over the basic question (Item A), adding about 2.1 million people, and bringing the total number with a work disability to 12.9 million people. The NHIS estimate is 7.8 million people aged 18 to 64 with a severe work disability (unable to work).[1] The 1990 decennial census estimate, however, is 6.6 million people with a severe work disability, about 1.2 million lower than the CPS and NHIS. The lower estimate of severe work disability in the census could be explained in part by the 6-month duration criterion.

One step in the Bureau's adjustment is to classify as having a nonsevere work disability people who have ever retired or left a job because of a health problem (Table A, Item F) but do not say they are limited in work (Bennefield et al., 1989). The Bureau estimates from the 1990 CPS that 6.3 million people aged 16 to 64 had a nonsevere work disability (McNeil et al., 1991), and the 1990 NHIS estimate is also 6.3 million people aged 18 to 64 with a nonsevere work disability. The 1990 decennial census yields a similar estimate of people with a nonsevere work disability, 6.2 million. However, this adjustment is less defensible than the adjustments for severe work disability since prior retirement may be only weakly related to current work disability. A person's condition may improve through medical and rehabilitation services and he or she may be able to resume the same kind of work done before. Workplace accommodations may enable people with impairments to return to jobs they formerly held.

The objective of this study is to compare estimates from the three data sources that are based on similarly conceived and operationalized measures. People who have ever retired or left a job for health reasons but do not state that they are limited in work are not included in this study as having a work disability. The estimate of the number of people with nonsevere work disability from this study is lower than that of the Bureau's CPS estimate by about 1.3 million (5.0 versus 6.3 million people), but the estimated number of people with severe work disability remains the same as the Bureau's estimate.

In summary, when the CPS measure of *nonsevere* work disability is derived from the basic measure of work disability (Table A, Item A), the CPS estimate is lower than the 1990 census and the 1990 NHIS estimates of nonsevere work disability. The 1990 CPS estimate of *severe* disability is comparable to the 1990 NHIS estimate, but the 1990 census estimate is lower than the two survey estimates. These results can be explained partly as due to two differences in method: the restriction in the decennial census that the disability have lasted 6 months or more, and the household screen approach used in the CPS, which may tend to lower estimates of nonsevere work disability. However, the 6-month duration criterion should also reduce the estimate from the 1990 census for severe disability compared to the survey estimates. It is important to remember that the census is a mailed questionnaire (with some follow-up by household visits and by phone), whereas the CPS and the NHIS are household visitations (with some telephone follow-up). Interviewer effects and a variety of other nonsampling effects can play a role. Also, there is some evidence that estimates of nonsevere work disability are highly variable. An independent comparison of estimates of work disability from these and other national surveys finds much greater consensus on estimates of severe than on nonsevere work disability (McNeil, 1989).

SAMPLING CONSIDERATIONS

The Current Population Survey is a large multistage stratified cluster sample survey of approximately 60,000 households and is designed to provide statistically accurate data on labor force activity for each of the states and the District of Columbia (Creighton, 1984; Hanson, 1978; Robison, 1992). The CPS is a sample of 1 in approximately 1,600 households (about 160,000 people) and is subject to statistical sampling error. However, the size and design of the CPS is such that it provides estimates of labor force activity within a small range of sampling error (coefficient of variation[2] of 8 percent on the number of unemployed people) for the states. In the first sampling stage, the entire United States is divided into 1,973 Primary Sampling Units (called PSUs, which are geographic areas composed usually of counties or combinations of counties) from which 727 are sampled. Of these, 348 PSUs are "self-representing" and included in the sample with certainty. "Non-self-representing" PSUs are grouped into 379 homogeneous strata of roughly equal population size that are not allowed to cross state boundaries. An algorithm is employed that clusters together PSUs that are similar on labor force characteristics obtained from the 1980 census. One PSU is sampled from each stratum with probability proportional to size. The CPS samples households monthly, but the questions on work disability are asked only in March. Selected PSUs are shown in Appendix Figure A.1.

The National Health Interview Survey is also a large multistage stratified cluster sample survey of households, but it is designed to produce estimates of health characteristics for the nation, four major regional divisions, and selected places of residence, rather than for the individual states (Massey, 1989). The NHIS is slightly smaller (about 50,000 households and 130,000 people are surveyed) than the CPS and much less geographically representative. In the first sampling stage, the entire United States is divided into 1,900 PSUs, which are grouped into 125 homogeneous strata based on health-related characteristics, including percent Hispanic/ non-Hispanic, poor/non-poor, low-income/non-low-income households, urban/non-urban, unemployed, and employed in manufacturing. Fifty-two self-representing strata are selected with certainty, and 2 areas are selected from the other strata with probability proportional to size, yielding 198 sampled areas—only a quarter of the number of PSUs sampled in the CPS. Strata are not defined entirely within

[1] The number of people aged 16 to 17 with a work disability is negligible.

[2] The coefficient of variation of the sample is equal to the standard error divided by the sample mean.

state boundaries as in the CPS. Sampled areas that span state boundaries are subsequently divided by state, and all sampled areas can be uniquely identified by state. If the sample size is large enough, the NHIS can provide a direct estimate for a state (National Center for Health Statistics, 1978; Schaible et al., 1979). Estimates for states with low sampling fractions will be less precise.

The NHIS complements the decennial census and the CPS by providing a broader measure of disability (activity limitation) that is applicable to all age groups. No disability measures provided by the decennial census or the CPS cover children or activities other than major role.

Sampled individuals in the NHIS are representative of the nation and the region of the country they reside in—they do not necessarily represent the population of the state they reside in. Individuals are sampled in the NHIS in 49 states and the District of Columbia (no individuals are sampled from Nebraska and North Dakota). In the CPS, however, all states are covered.

Because of differences in sample design, NHIS estimates for states have more variance than CPS estimates. Two kinds of sampling error can be distinguished: between-PSU sampling variance and within-PSU sampling variance (Moore & Tadros, 1989). In designing a sample, within-PSU variance can be reduced by selecting a larger sample of households within each PSU. Between-PSU variance can be reduced by selecting a larger sample of PSUs (assuming that PSU definitions are not changed). Mainly in response to rising interviewer and travel costs, the NHIS reduced the number of PSUs from 376 to 198 in the current (1985-94) sample design (Massey, 1989). In effect, this almost doubled the between-PSU variance in the NHIS, but the overall precision of the survey was held constant by doubling the number of households selected within each PSU (from 4 to 8 households expected per cluster). Selected PSUs are shown in Appendix Figure A.2.

The sample sizes in the CPS and the NHIS are approximately equal and have about equal variances for national estimates. But because the CPS samples more PSUs than the NHIS, the CPS has a lower between-PSU variance than the NHIS. The greater between-PSU variance in the NHIS means greater variance for state estimates. In both surveys, the between-PSU variance stays constant throughout the period of time a particular design is employed.

The number of households sampled from each state in the 1991 CPS and the 1990 NHIS is shown in Table 1 (1991 CPS data are equivalent to 1990). In the CPS, New Hampshire is represented by 443 households, the fewest sampled in any state. In the NHIS, New Hampshire is represented by only 49 households. Sixteen states are represented in the NHIS by fewer households than the minimum number of households for any state in the CPS. These states will have greater variance in the NHIS than in the CPS.

In both the CPS and the NHIS, weights are ratio-adjusted so that totals will equal the national population enumerated in the most recent census (and projections for subsequent years) by age, gender, and race. The CPS is also ratio adjusted to equal the enumerated population of each state, but the NHIS is not. The variance of state estimates from the NHIS could be reduced by ratio adjustment, but would be expected to provide a negligible reduction in the overall level of variation and was not undertaken in the present study.

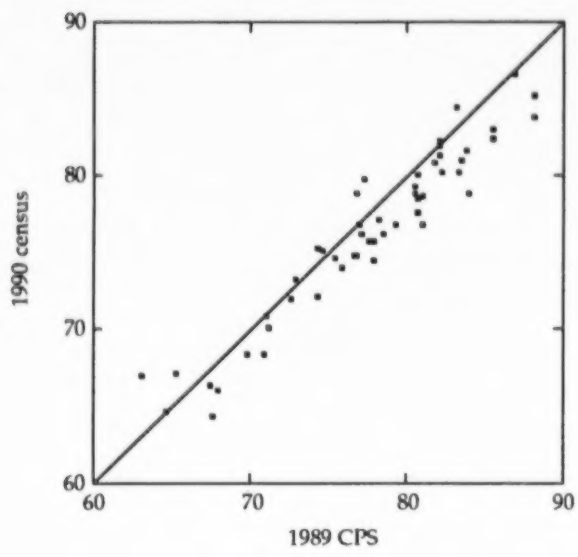
The precision of NHIS or CPS estimates for states depends not only on the sample design but on the type of measure as well. A specific design criterion used in the CPS is that the number of unemployed people in a state have a coefficient of variation of 8 percent, assuming an unemployment rate of 6 percent. The unemployment rate is relatively low in prevalence, and it has greater relative sampling variability than a higher prevalence rate, such as the percentage of women or men in a state population. Rates for rare events will be much more variable, and the sample size may be insufficient in the NHIS or the CPS to estimate such events. Of concern in this study is the level of precision of state disability estimates from both surveys. Standard errors of rates were computed using generalized variance formulas provided by the Bureau of the Census and the National Center for Health Statistics (see Appendix for details). The mean coefficient of variation (unweighted average for the states) serves as a measure of the overall sampling variability for the states.

This study compares state estimates of disability computed from the 1990 CPS and the 1990 NHIS with the 1990 census values. The differences in definitions noted above will cause systematic differences in estimates of disability. Therefore, the *association* of the estimates with the census values for the states is examined, rather than a measure of their deviation from the census values. The lower between-PSU variance in the CPS should result in a higher association of estimates of work disability with the 1990 census values than should be observed using 1990 NHIS estimates. The association of 1990 NHIS estimates of disability in basic life activities with the 1990 census estimates is also studied. The extent to which the estimates are associated with the census provides a measure of their accuracy and a level of confidence in their utility for producing intercensal estimates.

RESULTS

Before discussing results for disability, a relatively more frequent event that is expected to be reported much more reliably than disability is examined: the percent of the population completing high school or four years of college. This quantity can be estimated from all three data sets and provides a baseline measure of the accuracy of the two samples. If the CPS or the NHIS cannot estimate this quantity reliably, there is little point in proceeding to estimates of disability. CPS estimates of educational attainment of people aged 25 and older are taken from the Statistical Abstract of the United States (U.S. Bureau of the Census, 1991). Estimates were tabulated from the NHIS and are shown in Table 1. As expected, estimates from the 1989 CPS of the percent of the population completing high school are considerably closer to the 1990 census values than are estimates from the 1990 NHIS (Figure A, next page). A regression line fit to the 1990 census, using the 1989 CPS data, accounts for 92 percent of the variance, whereas the NHIS accounts for 73 percent (Table C, next page). On average, NHIS are higher than those of the census, representing a systematic

FIGURE A. STATE ESTIMATES OF THE PERCENT OF THE POPULATION COMPLETING HIGH SCHOOL FROM THE 1989 CPS AND THE 1990 NHIS COMPARED TO 1990 CENSUS



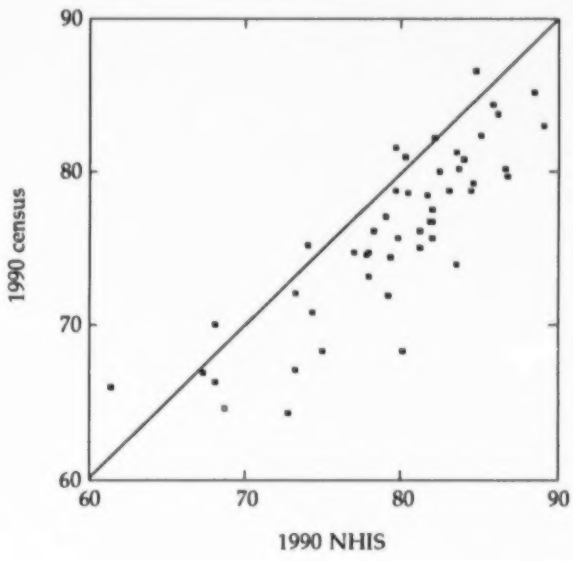


TABLE C. DESCRIPTIVE STATISTICS FOR ESTIMATES OF THE PERCENT OF THE POPULATION AGED 25 AND OLDER HAVING COMPLETED HIGH SCHOOL FOR STATES

	1990 Census	1990 CPS	1990 NHIS	1988-90 NHIS
N	51	51	49	49
Min	64.3	63.2	61.5	62.3
Max	86.6	88.2	89.1	89.1
Mean	76.2	77.7	79.6	78.6
Variance	31.3	37.7	34.7	35.7
Std Dev	5.6	6.1	5.9	6.0
Regression fit to 1990 census:	--			
Intercept	NA	8.5† (2.9)	11.0 (1.9)	10.4* (2.1)
Slope	NA	.873§ (23.5)	.818§ (11.2)	.836§ (13.0)
R-squared	NA	.919	.728	.781

* p<.05; † p<.01; § p<.001

TABLE D. DESCRIPTIVE STATISTICS FOR ESTIMATES OF THE PERCENT OF THE POPULATION AGED 25 AND OLDER HAVING COMPLETED FOUR YEARS OF COLLEGE FOR STATES

	1990 Census	1989 CPS	1990 NHIS	1988-90 NHIS
N	51	51	49	49
Min	12.3	11.1	9.5	11.3
Max	33.3	35.2	40.5	35.9
Mean	20.0	20.7	22.3	21.5
Variance	17.4	21.6	38.9	30.7
Std Dev	4.2	4.7	6.2	5.5
Regression fit to 1990 census:				
Intercept	NA	2.4† (2.9)	7.96§ (5.8)	6.6§ (4.6)
Slope	NA	.851§ (21.1)	.545§ (9.2)	.626§ (9.8)
R-squared	NA	.901	.642	.670

† p<.01; § p<.001

Sources (Tables C,D): 1990 census: U.S. Bureau of the Census (1992), unpublished data from the 1990 census. 1989 CPS: U.S. Bureau of the Census (1991). Statistical Abstract of the United States, 1991 (111 ed.), Table 227. Washington, DC: U.S. Government Printing Office. [Data from the March Current Population Survey]. NHIS: Author's tabulations from the National Health Interview Survey public use data tapes, 1988-90. Nebraska and North Dakota are not sampled.

difference that could result from greater between-PSU variance or nonsampling error.

The differences between CPS and NHIS estimates and 1990 census values are shown in Figure B by the number of households sampled in each state. In both survey samples, the estimates deviate more from census values for states with fewer sampled households, but the estimates are consistently higher in the NHIS and the range is greater. The coefficient of variation (CV) is shown in Table 1 for each state. In general, these data confirm what figures A and B show: the mean CV is larger for state estimates in the NHIS than in the CPS. The average coefficient of variation for the states on percent completing high school is 2.5 in the NHIS, and 1.6 in the CPS.

Estimates from the 1989 CPS of the percent of the population completing four years of college are also considerably closer to the 1990 census values than are estimates from the 1990 NHIS (Figure C, next page). The CPS estimates account for 90 percent of the variation in the census values, whereas NHIS estimates account for just 64 percent (Table D). Again, on average, the NHIS estimates are higher than the census, further evidence of a systematic difference that could result from greater between-PSU variance or nonsampling error.

Again, the estimates deviate more from census values for states with fewer sampled households, and are consistently higher in the NHIS with a greater range than the CPS estimates (Figure D, next page). The average coefficient of variation for the states on the percent completing four years of college is 9.8 in the NHIS and 6.1 in the CPS (Table 1). States with few sampled households in the NHIS have much greater sampling error on estimates of educational attainment than the same states in the CPS. The sampling error for New Hampshire—the state with the fewest sampled households in the NHIS—is three times as great in the NHIS as in the CPS. A method of reducing sampling variance in the NHIS is to combine several years of data. For national estimates, the sampling error should be reduced by the square-root of the number of years combined. For state estimates, the yield may be smaller since combining years reduces only within-PSU sampling variance, not between-PSU variance. Combining years has the greatest impact when within-PSU variance is a large fraction of the total variance.

The years 1988, 1989, and 1990 of the NHIS are combined to produce three-year average estimates of educational attainment. Though the sampling variation should be reduced when three years are averaged, a negligible improvement in the fit to census values is found for the percent completing high school (Table C) and the percent completing college (Table D), suggesting that for educational attainment, much of the difference between the 1990 census and the NHIS estimates is probably due to between-PSU variance.

These results provide verification that the NHIS can yield state estimates of educational attainment with some accuracy, despite the limitations of the sample design. As expected, NHIS estimates are less accurate than CPS estimates. Since the accuracy and precision of estimates may vary from measure to measure, the application of both surveys to produce state estimates of disability must be evaluated carefully.

FIGURE B. DIFFERENCE FROM 1990 CENSUS IN STATE ESTIMATES OF THE PERCENT OF THE POPULATION COMPLETING HIGH SCHOOL FROM THE 1989 CPS AND THE 1990 NHIS BY NUMBER OF SAMPLED HOUSEHOLDS

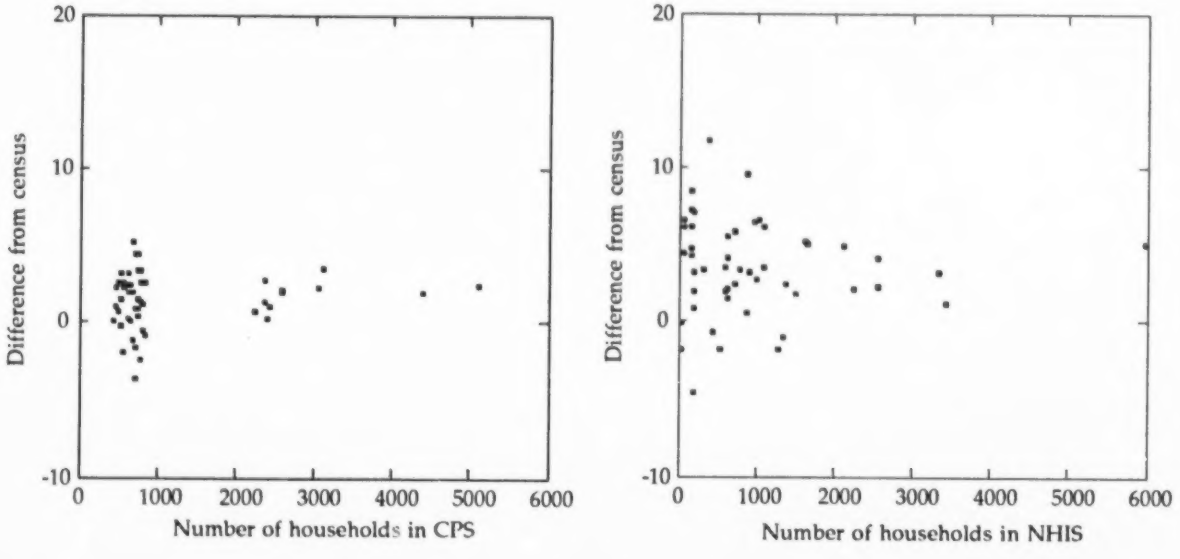


FIGURE C. STATE ESTIMATES OF THE PERCENT OF THE POPULATION COMPLETING FOUR YEARS OF COLLEGE FROM THE 1989 CPS AND THE 1990 NHIS COMPARED TO THE 1990 CENSUS

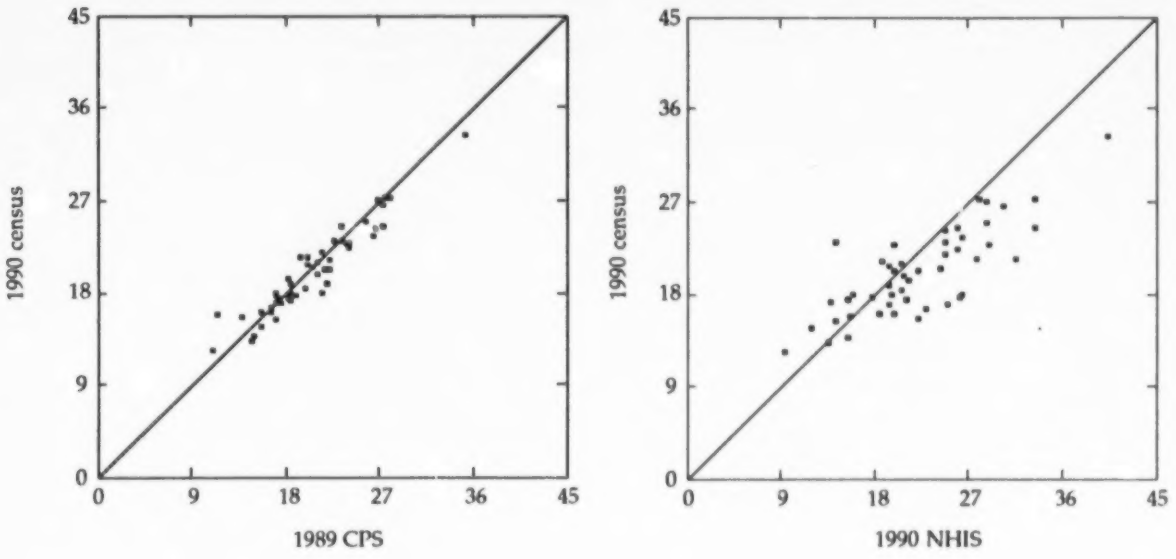
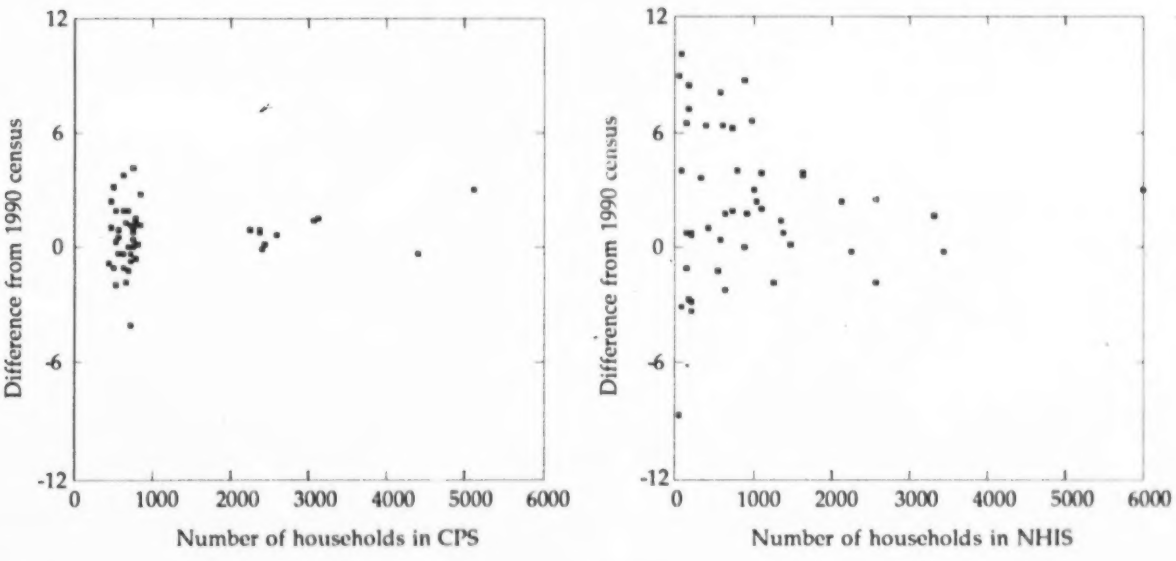


FIGURE D. DIFFERENCE FROM THE 1990 CENSUS IN STATE ESTIMATES OF THE PERCENT OF THE POPULATION COMPLETING FOUR YEARS OF COLLEGE FROM THE 1989 CPS AND THE 1990 NHIS BY NUMBER OF SAMPLED HOUSEHOLDS



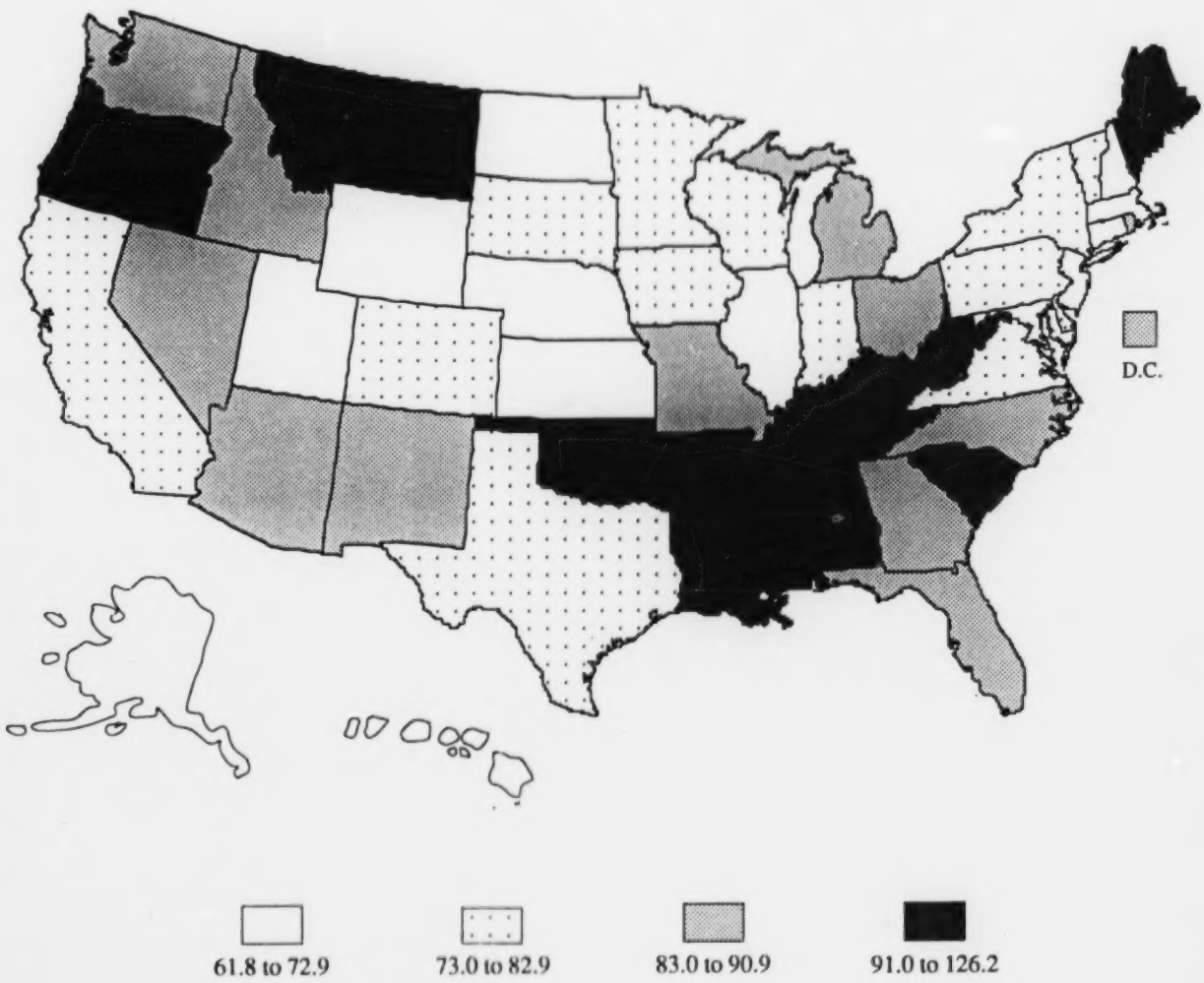
1980 AND 1990 CENSUS ESTIMATES OF DISABILITY

WORK DISABILITY

Direct state estimates of the number and proportion of people who are limited in the amount or kind of work they can do or who are unable to work have been produced from the 1980 census (Bowe, 1984; U.S. Bureau of the Census, 1985). These estimates are reproduced here, recomputed as rates per thousand population (Table 2). In 1980, 85.2 people per thousand population, aged 16 to 64 and living in households, experienced some work disability. This proportion varied considerably across the states: Arkansas, West Virginia, Mississippi, Kentucky, and Oklahoma were the five states with the highest rates of work limitation per thousand population in 1980 (127.3, 123.4, 117.6, 113.9, and 107.6, respectively); Alaska, Hawaii, Wyoming, Connecticut, and North Dakota had the lowest rates (54.0, 59.2, 61.4, 65.1, and 67.0, respectively). These extremes are significant—in 1980, an individual in Arkansas had more than twice the likelihood of having a work disability as a person in Alaska. Southern states have the highest rates of work disability; the ten states with the highest rates are all from the south.

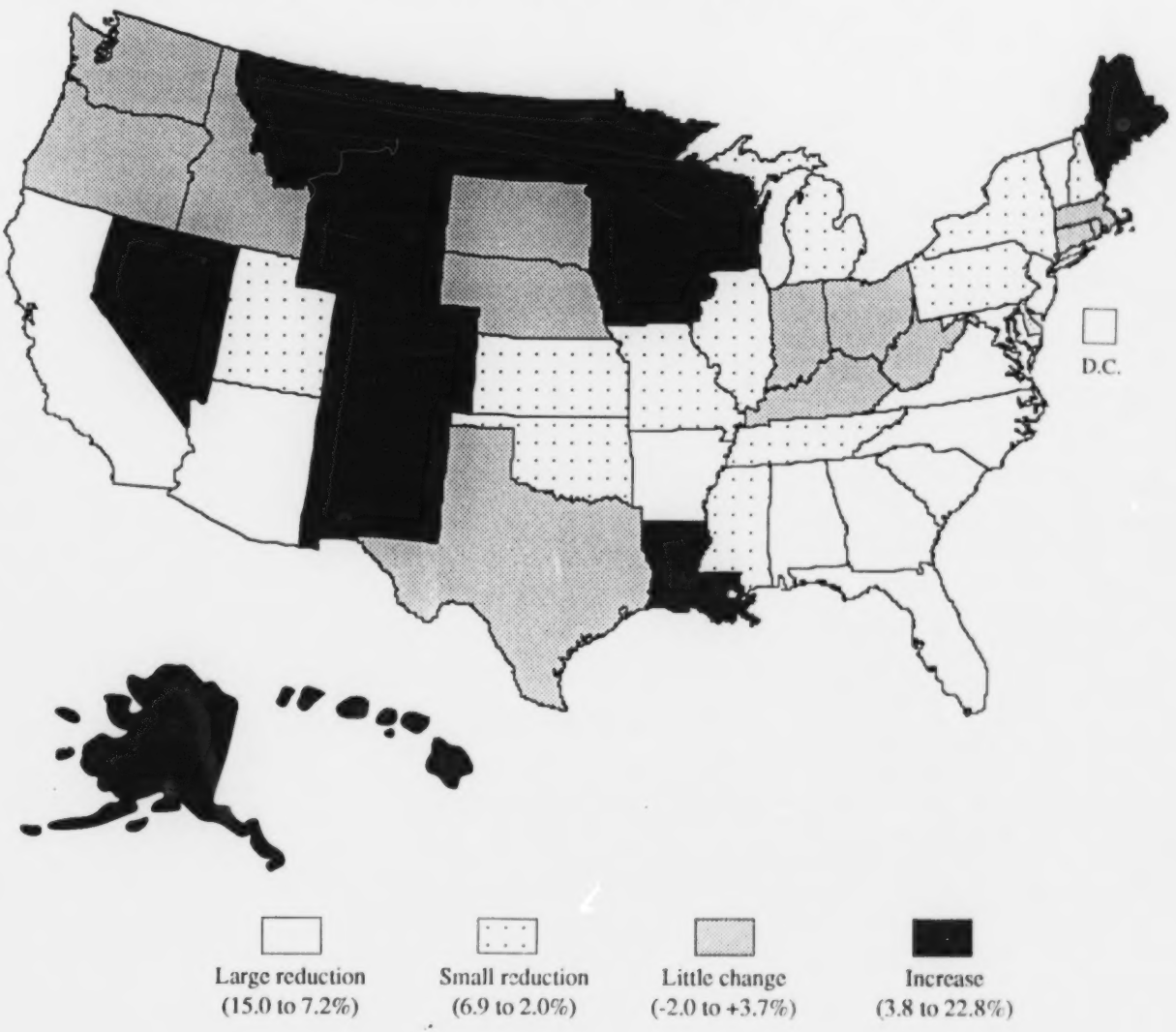
In 1990, the pattern of disability rates is similar to 1980, with southern states continuing to be highest (Figure E). At the national level, a slight decline occurred

FIGURE E. NUMBER OF PEOPLE PER THOUSAND POPULATION AGED 16 TO 64 WITH A WORK DISABILITY, BY STATE, 1990



Source: 1990 Census of Population and Housing

FIGURE F. PERCENT CHANGE FROM 1980 TO 1990 IN THE NUMBER OF PEOPLE PER THOUSAND POPULATION AGED 16 TO 64 WITH A WORK DISABILITY, BY STATE



Source: 1990 Census of Population and Housing

from 1980 to 1990 in the proportion of the population aged 16 to 64 with a limitation in work, from 85.2 to 81.5 per thousand, a decline of 4.3 percent. This decline follows a more substantial one from the 1970 to the 1980 census.[3] From 1980 to 1990, rates went down for 30 states, many of which are southern states, and up for 21 states, many being midwestern and western states, showing some regression to the mean (Figure F). Georgia, at 8th highest rank in 1980, decreased the most (by 14.6 percent) and fell to 17th place while Alaska, ranked lowest in 1980, increased the most (by 22.8 percent) and rose to 48th place. Some substantial shifts in the rankings occurred for certain other states. Florida, the District of Columbia, California, and Maryland fell in rank by 10 or more places, and Montana, Colorado, and Louisiana increased in rank by 10 or more places. New Jersey displaced Alaska as the state with the lowest rate of work disability at 61.8, and West Virginia displaced Arkansas as the state with the highest rate at 126.2 per thousand, twice as high as New Jersey in 1990.

Though some states changed more than others, state rates of work disability in 1990 are highly correlated with 1980 rates ($r=0.905$, $p<.001$), indicating a high degree of stability in the relative position of the states.

[3] For the population aged 18 to 64, the proportion of men with a work disability was 10.7% in 1970 and 9.6% in 1980, a decline of 10.3 percent (Yeas, 1991). The proportion of women with a work disability was 9.0% in 1980 and 8.4% in 1980, a decline of 6.7 percent. Values for 1970 have been adjusted to remove persons with a work disability that lasted less than 6 months to increase comparability to 1980 values.

SEVERITY OF WORK DISABILITY

In 1990, of the 12.8 million people aged 16 to 64 years who had a work disability (81.5 per 1,000), 6.6 million (41.9 per 1,000) could not work at all (severe work disability) and 6.2 million (39.6 per 1,000) could work but were limited in the kind or amount of work they could do (nonsevere work disability). West Virginia, Kentucky, Mississippi, Arkansas, and Louisiana had the highest rates of severe work disability (83.7, 72.8, 70.8, 65.8, and 64.0 per 1,000, respectively). Alaska, Connecticut, Minnesota, Utah, and Nebraska had the lowest rates of severe work disability (23.1, 26.5, 26.5, 28.5, 29.2 per 1,000, respectively). An even greater range exists between states in rates of severe work disability—the rate of severe work disability in West Virginia is 3.6 times that in Alaska.

Nationally, the rate of severe work disability went down from 43.6 per 1,000 in 1980 to 41.9 per 1,000 in 1990, a decline of 3.9 percent.[4] The rate of severe work disability declined for 25 states and increased for 26 states. Montana had the greatest increase—by 40.1 percent—and Florida the greatest decline—by 18.8 percent. States that increased the most were more likely to be western and midwestern states; states that declined the most were more likely to be southern. Severe work disability remained a consistent problem for states with high rates. Four states—West Virginia, Kentucky, Arkansas, and Mississippi—ranked at the top in both 1980 and 1990. The rate increased by more than 6 percent in West Virginia and Kentucky, remained about the same in Mississippi, and declined by almost 10 percent in Arkansas. Although some states changed more than others, rates of severe work disability in 1990 are very highly correlated with rates in 1980 ($r=0.939$, $p<.001$).

States that rank at the top on nonsevere disability in 1990 include Oregon, Idaho, Maine, Washington, and Montana. Nationally, the rate of nonsevere work disability declined by 4.7 percent from 1980 to 1990.[5] The rate declined for 30 states and went up for 20; in Pennsylvania the rate remained the same. Again, many of the states that went up were western and midwestern; of those that went down, many were southern states. The correlation in the 1980 and 1990 rates of nonsevere work disability is high ($r=0.816$, $p<.001$) but lower than the correlation observed for severe work disability, indicating that states are somewhat more variable on nonsevere work disability.

State rates of severe and nonsevere disability are independent. No significant correlation between rates of severe and nonsevere work disability is observed for states ($r=0.007$, $p>.05$). None of the states that rank in the top 5 on the rate of severe work disability rank high on the rate of nonsevere disability. Mississippi and Louisiana rank third and fifth on severe work disability, but are tied for 35th place on nonsevere work disability. However, the overall rate of work disability is correlated with the rate of severe work disability ($r=0.921$, $p<.001$). This suggests that different sets of factors may influence rates of severe and nonsevere disability.

In summary, states differ considerably in the rate and severity of work disability. The states rank fairly consistently in the 1980 and 1990 census for severe work disability, but varied more in rates of nonsevere work disability over time.

MOBILITY AND SELF-CARE DIFFICULTY

The 1990 census is the first to provide estimates of people aged 16 and over with outside mobility limitation (any difficulty going outside the home alone) and/or self-care limitation (any difficulty taking care of personal needs, such as bathing, dressing, or getting around inside the home). These estimates are based on questions 19a,b of the long form in which the individual items making up the self-care category are aggregated and cannot be estimated separately (Table B).

Nationally, about 13.2 million people aged 16 and over (70.5 per 1,000) are estimated to have some difficulty in outside mobility or self-care. The prevalence of outside mobility limitation is slightly lower than self-care limitation (8.1 versus 8.9 million). About 29 percent of the 13.2 million have both types of limitation.

At ages 65 and over, the rate of having an outside mobility or self-care limitation is 201.1 per thousand, over four times as high as the rate at ages 16 to 64. The rate among the elderly is slightly lower than the 1984 National Health Interview Survey Supplement on Aging (Dawson & Adams, 1987) estimate of 227 per thousand with a self-care difficulty (including difficulty getting outside) and matches the 1987 National Medical Expenditure Survey estimate of 201 per thousand (LaPlante, 1992).

The states that rank highest on the rate of mobility and self-care limitation are Mississippi, Alabama, District of Columbia, West Virginia, and Arkansas (Table 3). The rate in Mississippi (104.1 per 1,000) is 3.2 times as high as the rate in Alaska (32.7 per 1,000), the lowest ranking state. Utah, North Dakota, Vermont, and Wyoming also rank in the bottom five. Among people aged 65 and older, the rate of difficulty in basic life activities in Mississippi is twice as high as in South Dakota, the lowest ranking state (276.9 and 133.0 per 1,000 respectively).

Though the rate of mobility limitation and, to a lesser extent, self-care limitation increases with age, age does not seem to make much difference in the variation of rates of mobility or self-care limitation across states: rates of mobility and/or self-care limitation per thousand population at ages 16 to 64 years and at ages 65 years and older are highly correlated ($r=0.899$, $p<.001$). Rates of mobility difficulty are also highly correlated for both young and old age groups ($r=0.913$, $p<.001$), as are rates of self-care difficulty ($r=0.904$, $p<.001$). The rate of total work disability at ages 16 to 64 is also highly correlated with the rate of mobility limitation at ages 16 to 64 ($r = 0.930$, $p<.001$). Thus the rate of mobility limitation is predictive of the rate of total work disability in the states.

It should be noted that the rate of self-care limitation exceeds the rate of mobility limitation at ages 16 to 64,

[4] This trend is counter to the increase in the proportion of the population unable to work that occurred from 1970 to 1980 (Yeas, 1991) which was concentrated among older working age men.

5 This decline is much smaller than the almost 25% decline in partial work disability that occurred from 1970 to 1980 (Yeas, 1991).

but the opposite is true at ages 65 and over, due to the high rate of increase in mobility limitation with age. Also of note is that about 55 percent of people with a mobility or self-care difficulty are aged 16 to 64, as are 60 percent of people with a self-care difficulty.

COMPARING CPS AND NHIS ESTIMATES OF DISABILITY TO CENSUS ESTIMATES

Based on the 1990 CPS operationalization of work disability discussed above, 81.3 people per 1,000 (12.9 million people) aged 16 to 64 are estimated (Table 4) to have a work disability; 49.6 per 1,000 have a severe work disability; and 31.7 per 1,000 have a nonsevere work disability. As discussed above, the CPS estimate of severe disability is higher than the 1990 census, but the rate of nonsevere work disability is lower, which is partly due to nonsampling error. Also, because the CPS is a sample survey, estimates for the states are subject to sampling error and are therefore less precise than the 1990 census estimates. The ranking of the state estimates is also less precise. The states that rank highest in the rate of work disability per thousand population are Louisiana, West Virginia, Alabama, Mississippi, and Tennessee (120.2, 120.2, 113.1, 112.0, and 111.9 per 1,000, respectively). Three of these states—Louisiana, West Virginia, and Mississippi—also rank in the top 5 according to the 1990 census. Alabama ranks 11th and Tennessee ranks 9th in the 1990 census. The states that rank lowest are Connecticut, Alaska, New Jersey, Nebraska, and Nevada (44.8, 53.4, 56.1, 56.6, and 61.7 per 1,000, respectively). Three of these states—New Jersey, Connecticut, and Alaska—also rank in the bottom 5 according to the 1990 census. In the 1990 census, Nebraska ranks 44th and Nevada 24th. Several other states besides Nevada rank differently in the 1990 CPS than they do in the 1990 census, owing in part to greater sampling variability.

As in the decennial census, the CPS finds significant extremes in the rate of work disability across states. The rate of any work disability in Louisiana is over two and a half times the rate in Connecticut, the lowest ranking state (120.2 and 44.8 per 1,000). The rate of severe work disability in Alabama is almost four times that in Connecticut (85.9 and 22.5 per 1,000). These direct estimates of work disability for the states show a similar range of variation as the 1990 census values and appropriately greater variation than a synthetic approach could be expected to yield.

Nationally, 93.2 people per thousand population are estimated from the NHIS to have a work disability in 1990, 51.7 per thousand have a severe work disability (unable to work) and 41.5 per thousand have a nonsevere work disability (limited in the amount or kind of work). As discussed above, the rates for severe work disability are higher than the 1990 census, but rates of nonsevere work disability are similar.

The average coefficient of variation on the rate of work disability is 16.1 percent in the 1990 NHIS and 10.3 percent in the CPS (34 percent lower). The sampling error in theory can be reduced in the NHIS by combining several years of data. The average coefficient of variation for the combined years 1988-90 is 10.2 percent (Table 5) and is comparable to the 1990 CPS. But this is only an approximate improvement in reliability. To determine the actual improvement, the 1988-90 NHIS, the 1990 NHIS, and the 1990 CPS estimates are compared with the 1990 census values. The 1990 CPS estimates have somewhat larger variance than the census, and the 1990 NHIS estimates have considerably higher variance, which is

TABLE E. DESCRIPTIVE STATISTICS FOR ESTIMATES OF THE NUMBER OF PEOPLE PER THOUSAND WORKING-AGE POPULATION WITH A WORK DISABILITY FOR STATES

	1990 Census	1990 CPS	1990 NHIS	1988-90 NHIS
N	51	51	49	49
Min	61.8	44.8	36.3	58.8
Max	126.2	120.2	172.0	193.0
Mean	84.0	81.0	99.1	100.0
Variance	198.2	279.0	750.1	594.1
Std Dev	14.1	16.7	27.4	24.4
Regression fit to 1990 census:				
Intercept	NA	28.7§ (4.9)	49.7§ (8.8)	42.1§ (7.1)
Slope	NA	.682§ (9.6)	.351§ (6.4)	.425§ (7.4)
R-squared	NA	.655	.466	.539

§ p<.001

Sources: 1990 census: U.S. Bureau of the Census (1992), unpublished data from the 1990 census. CPS and NHIS: Author's tabulations from public use data tapes. Nebraska and North Dakota are not sampled in the NHIS.

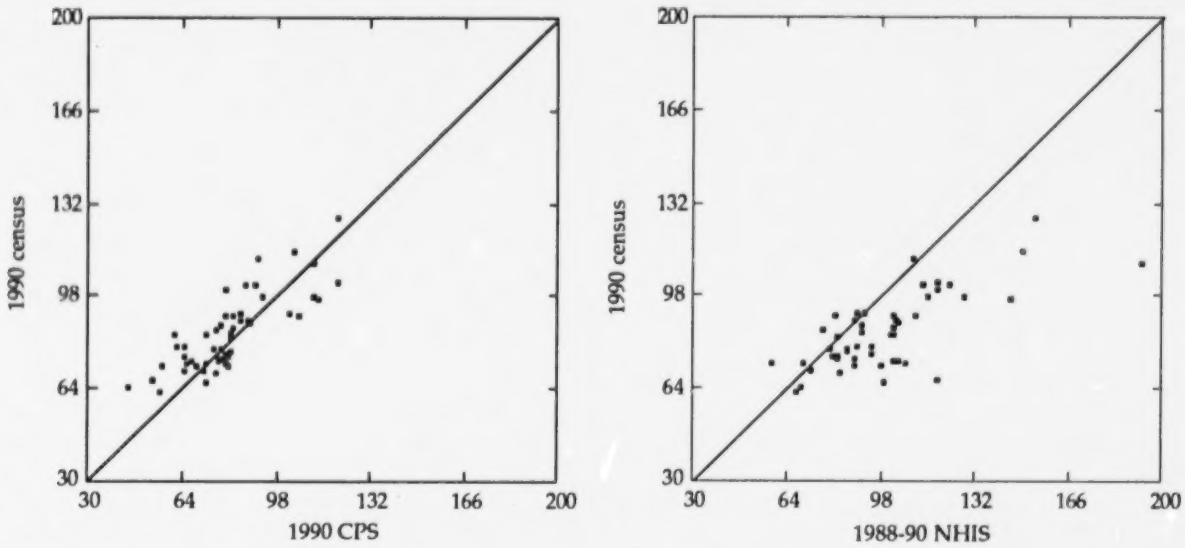
TABLE F. DESCRIPTIVE STATISTICS FOR ESTIMATES OF THE NUMBER OF PEOPLE PER THOUSAND WORKING-AGE POPULATION WITH A SEVERE WORK DISABILITY FOR STATES

	1990 Census	1990 CPS	1990 NHIS	1988-90 NHIS
N	51	51	49	49
Min	23.1	22.5	18.0	32.0
Max	83.7	85.9	125.8	110.0
Mean	41.9	47.3	55.9	54.2
Variance	167.2	228.5	528.3	285.4
Std Dev	12.9	15.1	23.0	16.9
Regression fit to 1990 census:				
Intercept	NA	7.8* (2.4)	18.9§ (5.7)	6.6* (2.1)
Slope	NA	.720§ (10.9)	.420§ (7.7)	.660§ (11.7)
R-squared	NA	.708	.556	.743

*p<.05; § p<.001

Sources: 1990 census: U.S. Bureau of the Census (1992), unpublished data from the 1990 census. CPS and NHIS: Author's tabulations from public use data tapes. Nebraska and North Dakota are not sampled in the NHIS.

FIGURE G. STATE ESTIMATES OF THE NUMBER OF PEOPLE PER THOUSAND POPULATION WITH A WORK DISABILITY FROM THE 1990 CPS, AND THE 1988-90 NHIS COMPARED TO 1990 CENSUS VALUES



reduced slightly for the 1988-90 estimates (Table E). The 1990 CPS and 1988-90 NHIS estimates are plotted against census values in Figure G.

The fit of the CPS estimates with the 1990 census values for work disability is moderately good, accounting for 65.5 percent of the variation in the census estimates. The NHIS estimates for 1990 fit less well, accounting for only 46.6 percent of the variation in the census. A slight gain in fit is obtained using three years of the NHIS data, accounting for 53.9 percent of the variation in the census values. The 1990 CPS is still more highly associated with the census values than even the three years of combined NHIS data.

For severe work disability, the CPS estimates account for 70.8 percent of the variation in the 1990 census estimates, better than the fit of the 1990 NHIS estimates. [Some gain is observed for combining years of the NHIS, increasing the explained variance in the 1990 census from 56 to 74 percent, which actually slightly exceeds the 1990 CPS (Table F). The 1990 CPS and 1988-90 NHIS estimates are plotted against census values in Figure H. In the CPS, even the eleven large states are not close to the census estimates (Figure I, next page). In both the 1990 CPS and the 1988-90 NHIS, the average coefficient of variation is about 14 percent (Tables 4, 5), which is still fairly high. The sampling variability in the CPS might be reduced further by averaging several years of the CPS, and the fit to the census values might improve.

For nonsevere work disability, the CPS estimates fit the 1990 census values poorly; the NHIS estimates do not fit the census at all (Table G). This lack of fit provides further evidence of the relatively greater variability of estimates of nonsevere work disability compared to severe work disability. Little improvement on this measure occurs when three years of NHIS data are used.

Recall that CPS estimates of the percent completing high school or four years of college account for just over 90 percent of the variation in 1990 census values. CPS

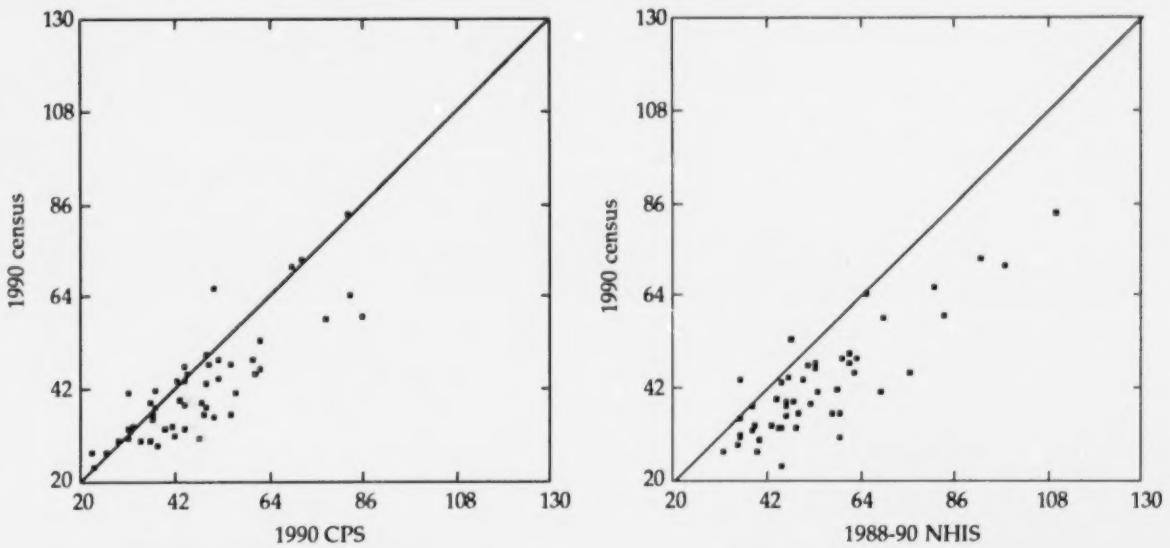
TABLE G. DESCRIPTIVE STATISTICS FOR ESTIMATES OF NUMBER OF PEOPLE PER THOUSAND WORKING AGED POPULATION WITH A NONSEVERE WORK DISABILITY FOR STATES

	1990 Census	1990 CPS	1990 NHIS	1988-90 NHIS
N	51	51	49	49
Min	31.3	14.2	18.3	22.8
Max	59.4	48.7	74.0	94.9
Mean	42.1	33.7	43.2	45.8
Variance	30.2	63.4	215.4	199.0
Std Dev	5.5	8.0	14.7	14.1
Regression fit to 1990 census:				
Intercept	NA	29.1§ (10.3)	39.8§ (15.9)	38.6§ (14.2)
Slope	NA	.386§ (4.7)	.055 (1.0)	.079 (1.4)
R-squared	NA	.312	.021	.039

§ p<.001

Sources: 1990 census: U.S. Bureau of the Census (1992), unpublished data from the 1990 census. CPS and NHIS: Author's tabulations from public use data tapes. Nebraska and North Dakota are not sampled in the NHIS.

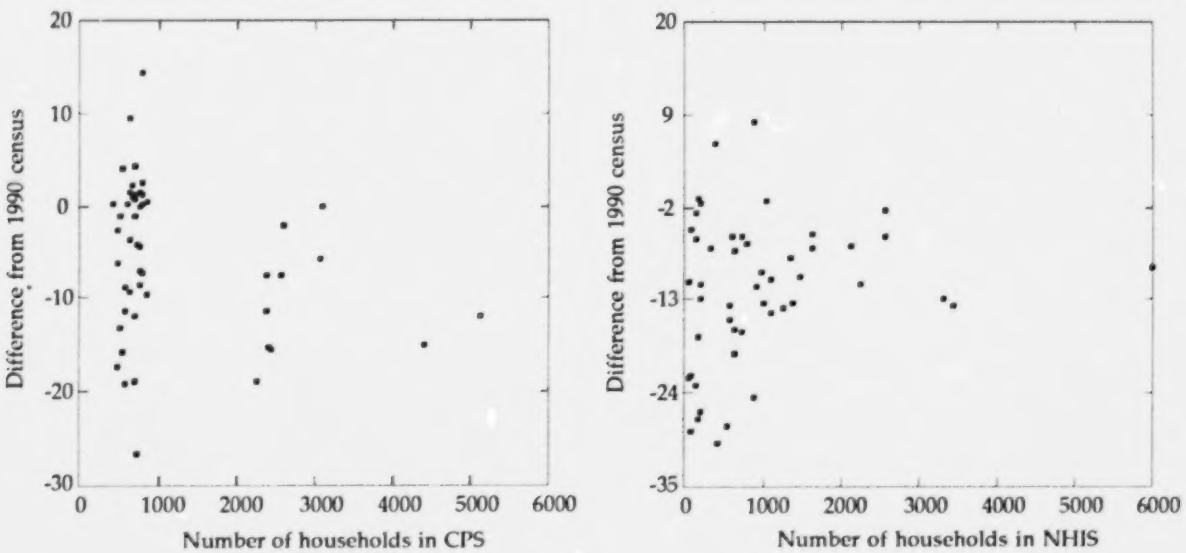
FIGURE H. STATE ESTIMATES OF THE NUMBER OF PEOPLE PER THOUSAND POPULATION WITH A SEVERE WORK DISABILITY FROM THE 1990 CPS, AND THE 1988-90 NHIS COMPARED TO THE 1990 CENSUS



estimates of work disability are not as highly associated with census values as are CPS estimates of educational attainment. Work disability is a less frequent event than graduation from high school or college, and is more subject to sampling variability.

In summary, although CPS and NHIS estimates of severe work disability are not associated highly enough with 1990 census values of disability to be used in their stead (as estimates of educational attainment could), the results are promising. Despite differences in definition and other potential sources of nonsampling error, the survey estimates of severe work disability are highly associated with the census estimates. The correlation between the 1990 NHIS and the census values is 0.746 and for the 1990 CPS, 0.841. Estimates of severe work disability are improved when several years of the NHIS are combined, the correlation with census estimates increasing to 0.862. Non- severe work disability is highly variable, and neither the CPS nor the NHIS estimates are highly associated with the 1990 census estimates. The accuracy of CPS estimates may also be improved by averaging several years, a task left to further study.

FIGURE I. DIFFERENCE FROM THE 1990 CENSUS IN STATE ESTIMATES OF THE NUMBER OF PEOPLE PER THOUSAND POPULATION WITH A SEVERE WORK DISABILITY FROM THE 1990 CPS AND THE 1988-90 NHIS, BY THE ANNUAL NUMBER OF HOUSEHOLDS SAMPLED



BASIC LIFE ACTIVITIES

The NHIS provides estimates of people needing assistance from others in performing basic life activities that can be compared with 1990 census estimates of difficulty in mobility and self-care (the CPS does not). Disability in basic life activities is a relatively rare event and NHIS estimates based on this measure have high sampling variability. As discussed above, disability in basic life activities is defined differently in the NHIS and the 1990 census. In the census, the two measures used are any difficulty in outside mobility and any difficulty in self-care. These will be referred to as "outside mobility difficulty" and "ADL difficulty." In the NHIS, the two measures used are whether someone needs assistance from another person in routine activities, such as shopping or getting around outside, referred to as "IADL assistance need," and self-care, referred to as "ADL assistance need." More people have difficulty in basic life activities than need assistance, therefore NHIS estimates are lower than census estimates.

The 1990 NHIS estimates of the rate of people aged 16 and older who need assistance in basic life activities have a high degree of sampling error. For any assistance, thirteen states have a sampling coefficient of variation exceeding 30 percent of the estimate, the average for the states being 26.4 percent. For ADL assistance, half of the states have a CV exceeding 30 percent, with the average for the states at 41.9 percent. In New Hampshire and Wyoming, no sampled individuals reported ADL assistance needs. Clearly, a single year of the NHIS is not sufficient for estimating assistance in basic life activities reliably.

Estimates averaged over three years (1988-90) are presented in Table 6. The coefficient of variation for the three years is reduced by 50 percent over the 1990 estimates, and only six states have a CV of over 30 percent. When three years of data are employed, the relationship of the NHIS estimates with the census values improves somewhat. The percent of the variation in the census estimates accounted for by the NHIS increases from 27.8 to 36.4 percent, but is still low (Table H). NHIS estimates of assistance needs in ADL are even less related to census values than are estimates of assistance needs in any basic life activity. Even with three years of data, the NHIS estimates account for only 13.8 percent of the variation in census values (Table I). Fourteen states have a CV exceeding 30 percent (Table 6). Because the rate of needing assistance is relatively low, even three years of data cannot provide precise estimates for states. The level of association of NHIS estimates of need for assistance in IADL with census estimates of difficulty in mobility is higher than that for ADL (Table J, next page) but is still low. Need for assistance to get around outside is the most common of the IADL items (LaPlante, 1991b; LaPlante, 1992), so there is enough overlap between the census and the NHIS definitions to expect a high association between the measures used.

In sum, the NHIS estimates of need for assistance in basic life activities have high sampling variance and are much less strongly related to the census values than are estimates of severe work disability. Being relatively rare events, sampling variability of these estimates is large even when three years of the NHIS are combined.

TABLE H. DESCRIPTIVE STATISTICS FOR ESTIMATES OF THE NUMBER OF PEOPLE PER THOUSAND POPULATION AGED 16 AND OLDER WITH DIFFICULTY OR WHO NEED ASSISTANCE IN BASIC LIFE ACTIVITIES FOR STATES

	1990 Census[1]	1990 NHIS[2]	1988-90 NHIS[2]
N	51	49	49
Min	32.7	6.2	16.0
Max	104.1	72.2	71.2
Mean	65.9	40.4	40.0
Variance	264.0	231.9	175.6
Std Dev	16.2	14.7	13.3
Regression fit to 1990 census:			
Intercept	NA	44.1[§] (7.8)	37.3[§] (6.3)
Slope	NA	.558[§] (4.3)	.734[§] (5.2)
R-squared	NA	.278	.364

[§] p<.001

1. Measure is difficulty in outside mobility or ADL.
2. Measure is need for assistance of another in IADL or ADL.

Sources: 1990 census: U.S. Bureau of the Census (1992), unpublished data from the 1990 census. NHIS: Author's tabulations from public use data tapes. Nebraska and North Dakota are not sampled in the NHIS.

TABLE I. DESCRIPTIVE STATISTICS FOR ESTIMATES OF THE NUMBER OF PEOPLE PER THOUSAND POPULATION AGED 16 AND OLDER WITH DIFFICULTY OR WHO NEED ASSISTANCE IN ACTIVITIES OF DAILY LIVING (ADL) FOR STATES

	1990 Census[1]	1990 NHIS[2]	1988-90 NHIS[2]
N	51	49	49
Min	22.2	0	2.8
Max	72.1	35.2	23.6
Mean	43.8	13.5	13.0
Variance	147.3	43.2	22.0
Std Dev	12.2	6.6	4.7
Regression fit to 1990 census:			
Intercept	NA	39.1[§] (10.0)	32.0[§] (6.7)
Slope	NA	.389 (1.5)	.952[†] (2.7)
R-squared	NA	.045	.138

[†] p<.01; [§] p<.001

1. Measure is difficulty in ADL.
2. Measure is need for assistance of another in ADL.

Sources: 1990 census: U.S. Bureau of the Census (1992), unpublished data from the 1990 census. NHIS: Author's tabulations from public use data tapes. Nebraska and North Dakota are not sampled in the NHIS.

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TABLE J. DESCRIPTIVE STATISTICS FOR ESTIMATES OF THE NUMBER OF PEOPLE PER THOUSAND POPULATION AGED 16 AND OLDER WITH DIFFICULTY OR WHO NEED ASSISTANCE IN OUTSIDE MOBILITY OR IN IADL FOR STATES

	1990 Census[1]	1990 NHIS[2]	1988-90 NHIS[2]
N	51	49	49
Min	19.8	6.2	16.0
Max	60.0	72.2	71.2
Mean	41.2	40.4	40.0
Variance	61.0	231.9	175.6
Std Dev	7.8	14.7	13.3
Regression fit to 1990 census:			
Intercept	NA	32.7§ (11.0)	27.1§ (9.2)
Slope	NA	.216† (3.1)	.358§ (5.1)
R-squared	NA	.173	.358

† p<.01; § p<.001

1. Measure is difficulty in outside mobility
2. Measure is need for assistance of another in IADL or ADL.

Sources: 1990 census: U.S. Bureau of the Census (1992), unpublished data from the 1990 census. NHIS: Author's tabulations from public use data tapes. Nebraska and North Dakota are not sampled in the NHIS.

ACTIVITY LIMITATION

Finally, utilizing data from the NHIS, state estimates of the rate of activity limitation at all ages are considered. The CPS does not employ this broader measure of disability. As was observed for the measures studied above, three-year estimates using 1988-90 data are expected to have lower variance than the single year 1990 estimates. No measure is available from the 1990 census that is exactly equivalent to the activity limitation measure used in the NHIS. However, work disability is a subset of activity limitation and 1990 census estimates of work disability should be associated with NHIS estimates of activity limitation.

The 1990 NHIS estimates of the rate of activity limitation account for 35.7 percent of the variance in rates of work disability from the 1990 census, increasing to 48.9 percent for the three years 1988-90. Thus the association of the NHIS activity limitation estimates with the census estimates is lower than for estimates of severe work disability but higher than for estimates of assistance needs in basic life activities. This provides a moderate level of confidence in the accuracy of the estimates.

However, the rate of limitation in activities other than major roles is not associated with census rates of work disability, accounting for only 6.6 percent of the variation based on the more reliable estimates using three years (Table L). This low association may indicate that nonmajor activity limitation is more variable than major activity limitation. In general, measures of less severe disability seem to be more highly variable than measures of severe disability (Recall that estimates of nonsevere work disability from the CPS and the NHIS were not highly associated with nonsevere work disability from the census.) Yet, these results may also reflect the inadequacy

TABLE K. DESCRIPTIVE STATISTICS FOR ESTIMATES OF PERCENT OF POPULATION AT ALL AGES WITH LIMITATION IN ACTIVITY

	1990 NHIS	1988-90 NHIS
N	49	49
Min	76.3	83.7
Max	197.6	199.2
Mean	143.1	143.4
Variance	815.3	684.0
Std Dev	28.6	26.2
Regression fit to 1990 census (work disability):		
Intercept	42.3§ (5.0)	30.5§ (3.7)
Slope	.295§ (5.1)	.377§ (6.7)
R-squared	.357	.489

§ p<.001

Sources: 1990 census: U.S. Bureau of the Census (1992), unpublished data from the 1990 census. NHIS: Author's tabulations from public use data tapes. Nebraska and North Dakota are not sampled in the NHIS.

TABLE L. DESCRIPTIVE STATISTICS FOR ESTIMATES OF PERCENT OF POPULATION AT ALL AGES WITH LIMITATION IN OTHER THAN MAJOR ACTIVITY

	1990 NHIS	1988-90 NHIS
N	49	49
Min	26.0	15.0
Max	115.5	76.1
Mean	47.4	45.8
Variance	286.6	113.4
Std Dev	16.9	10.7
Regression fit to 1990 census (work disability):		
Intercept	78.5§ (13.0)	69.7§ (8.3)
Slope	.127 (1.1)	.321 (1.8)
R-squared	.023	.066

§ p<.001

Sources: 1990 census: U.S. Bureau of the Census (1992), unpublished data from the 1990 census. NHIS: Author's tabulations from public use data tapes. Nebraska and North Dakota are not sampled in the NHIS.

of the comparison, since the census does not measure limitations in activities other than the work role. Rates of limitation in major activities are moderately associated with the rate of work disability in the 1990 census, accounting for 56 percent of the variation using three-year average estimates (Table M).

Because the three-year estimates have less variance and are more closely associated with the census estimates of work disability than the 1990 estimates, they are more reliable and are presented in Table 7. Estimates for Nebraska and North Dakota, the two states not sampled in the NHIS, are imputed from a regression model employing a variety of state data obtained from sources external to the NHIS to predict rates of activity limitation using 1986-88 NHIS data (Leroy, 1991).

The five states with the highest rates of activity limitation are Mississippi, Alabama, West Virginia, Rhode Island, and Kentucky (199.2, 196.4, 196.0, 191.5, and 187.3 per thousand); of them, four are southern states. Mississippi has a rate of activity limitation 2.4 times as high as Wyoming, the state with the lowest rate at 83.7 per thousand. The highest ranking states on rates of activity limitation also rank in the top five on limitation in major activity, and again, Wyoming ranks lowest. Mississippi's rate of limitation in major activity is 2.8 times as high as Wyoming's. These rates can be applied to population estimates from the 1990 census to yield the total number of people limited in activity in a state (Table 8). Estimated rates of limitation in nonmajor activity do not show consistent geographic patterns of variation.

TABLE M. DESCRIPTIVE STATISTICS FOR ESTIMATES OF PERCENT OF POPULATION AT ALL AGES WITH LIMITATION IN MAJOR ACTIVITY

	1990 NHIS	1988-90 NHIS
N	49	49
Min	37.8	41.5
Max	146.7	142.3
Mean	95.8	95.3
Variance	510.2	362.7
Std Dev	22.6	19.0
Regression fit to 1990 census (work disability)		
Intercept	46.2§ (6.7)	34.7§ (5.3)
Slope	.400§ (5.7)	.513§ (7.7)
R-squared	.410	.560

§ p<.001

Sources: 1990 census: U.S. Bureau of the Census (1992), unpublished data from the 1990 census. NHIS: Author's tabulations from public use data tapes. Nebraska and North Dakota are not sampled in the NHIS.

SUMMARY AND CONCLUSIONS

Census data show that the rate of work disability declined nationally, from 85.2 in 1980 to 81.5 per thousand people aged 16 to 64 years in 1990. Rates of work disability went down for 30 states, many of which are southern states, and up for 21 states, many being midwestern and western states, a pattern that generally held regardless of severity of work disability. The tide not being in their favor, states with increasing rates of work disability will experience more difficulty implementing the goals of the Americans with Disabilities Act (ADA) and other policy goals aimed towards reducing disability and undesirable societal reactions to disability.

Variation across states in rates of work disability in 1990 is significant. An individual in West Virginia is twice as likely as a person in New Jersey to have a work disability. Southern states tend to have the highest rates of work disability. An even greater range exists between states in rates of severe work disability—a person in West Virginia is over three and a half times as likely as one in Alaska to have a work disability. An individual in Mississippi is three times as likely as someone in Alaska to have a difficulty in mobility or self-care. Furthermore, these extremes are not due to differences in age structure: for both the 16 to 64 and 65 and older age groups, the rate of difficulty in basic life activities in Mississippi is more than twice as high as in the lowest ranking state.

The decennial census rates are enumerated population values, which are more likely than survey estimates to show the true range of variation between states in rates of disability. The census values are used to evaluate direct survey estimates of rates of disability for the states.

Two large national sample surveys—the Current Population Survey (CPS), which is designed for state estimates, and the National Health Interview Survey (NHIS), which is not designed to produce state estimates, are examined. The CPS yields estimates of rates of educational attainment almost identical to the census (for the percent graduating from high school, $r=0.959$, $p<.001$), but the NHIS estimates are more variable ($r=0.884$, $p<.001$). The latter is based on three years of the NHIS (1988-90) averaged together to increase reliability of the estimates. A single year of the CPS generally yields estimates that are more highly associated with census values than a single year of the NHIS.

Educational transitions are more frequent events than disability and are probably reported more reliably The CPS and the NHIS produce estimates of severe work disability for states that are highly associated with rates obtained from the 1990 census of the population ($r= 0.841$ and $r=0.862$, both $p<.001$, respectively), but less highly than for estimates of educational attainment. The NHIS matches the precision of the 1990 CPS for state estimates of severe work disability for the combined years 1988-90. Rates of nonsevere work disability do not match census values well for either survey, which may indicate a greater volatility of measures of nonsevere disability.

NHIS estimates of rates of assistance in basic life activities have high sampling variance and are not associated with census rates of difficulty going outside or in self-care. The 1990 census estimates of work disability and difficulty in mobility and self-care are preferred over survey estimates.

The measure of limitation in activity used in the NHIS is the broadest measure of disability, covering limitations, caused by chronic health conditions, in

socially structured activities significant to individuals in all age groups. In 1990, 33.8 million people are estimated to have an activity limitation, 13.7 percent of the U.S. population. The activity limitation measure is not employed in the census or the CPS. Rates of major activity limitation are moderately associated with census rates of work disability ($r=0.748$, $p<.001$) which serve as the closest proxy, but limitation in nonmajor activities is not associated at all with census rates of work disability. The NHIS estimates can be used as a rough measure of disability in the states. However, the lack of association of estimates of limitation in nonmajor activity with census data on work disability and the degree of sampling error should be acknowledged for any applications for which the estimates are used. These estimates can be combined with data on persons in institutions to estimate the total number of people with disabilities by state.

The direct estimation approach used with the surveys in this study generates estimates with greater variation than synthetic approaches typically produce. Comparison with census values shows that the degree of variation in survey estimates is appropriate.

Results of the present study provide some optimism that the CPS and the NHIS can be used to provide direct intercensal estimates of rates of severe work disability for the states. CPS estimates might be made even more accurate if several years are used. Furthermore, the study lends greater confidence that the CPS may be useful in monitoring rates of severe work disability in the states throughout the 1990's, providing information on changes in rates of work disability in the states (and possibly labor force participation) that can help in evaluating the progress of the states in implementing the goals of the Americans with Disabilities Act. To the extent that the ADA achieves its goals and people with severe disabilities join the labor force, rates of severe work disability should decline over time.

Many factors contribute to the wide variation in rates of disability across the states. Low educational attainment and low economic resources are typical of states that rank high on disability. These conditions, and other characteristics associated with them, may contribute to high prevalence of impairment and may also make it more likely that impairment results in disability.

Based on 1980 census data, one study (Haber, 1987) found that aggregate socioeconomic conditions of poverty and low education accounted for most of the observed variation in nonsevere and severe work disability across the states. These conditions are also likely to be associated with changing rates of disability in the states: the rate of high school completion has increased significantly over the period 1980 to 1990, from 66.5 to 75.2 percent nationally. In fact, the percent change from 1980 to 1990 in high school attainment for the states is significantly negatively correlated with the percent change in work disability ($r=-0.478$, $p<.001$). Other conditions associated with changing rates of work disability in the states should be further studied.

West Virginia and Alabama are the two states that consistently rank high on disability; Connecticut and Alaska consistently rank low. Despite gains made in high school completion during the 1980s, only two-thirds of people 25 years or older living in West Virginia or Alabama in 1990 had completed high school compared to 87 percent of Alaskans and 81 percent of people living in Connecticut (U.S. Bureau of the Census, 1991). Increasing educational attainment further in states with low educational levels may help to continue to reduce rates of work disability in states during the 1990s.

This study shows that state estimates of disability from the CPS are particularly reliable. To advance the establishment of national indicators on disability, it is imperative that CPS data on disability continue to be available, particularly data on work disability collected in the March CPS. More accurate indicators could be generated if data on work disability and labor force activity of people with disabilities were collected during the other months the CPS is conducted (Yelin, 1991), a step that is easily achievable. Further improvements in data on disability in the states could be obtained by including in the CPS questions on mobility and self-care difficulty now used in the decennial census and the activity limitation measure used historically in the National Health Interview Survey.

Certainly, the two- to three-fold differences between states in the probability an individual has a disability present a significant public health and public policy challenge for the decade that merits public scrutiny.

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TABLE 1. Number of Sampled Households in the National Health Interview Survey (NHIS) and the Current Population Survey (CPS) and Percent of People Aged 25 and Older Completing High School or Four Years of College from the NHIS, CPS, and Census, by State

	1990 NHIS						1989 CPS						1990 Census		
	House-holds	Persons (1,000s)	High school	CV*	College	CV	House-holds	Persons (1,000s)	High school	CV	College	CV	Persons (1,000s)	High school	College
United States	48,680	156,425	78.7	0.2	22.3	0.9	59,748	154,162	76.9	0.2	21.1	0.8	158,868	75.2	20.3
State															
Alabama	874	2,877	67.4	2.4	15.7	8.1	723	2,524	63.2	2.6	11.6	9.2	2,546	66.9	15.7
Alaska	53	463	84.8	3.7	14.3	21.3	768	282	86.9	1.3	23.4	6.1	323	86.6	23.0
Arizona	733	2,312	84.5	1.7	22.2	7.3	692	2,214	80.6	1.7	22.2	6.4	2,301	78.7	20.3
Arkansas	589	2,050	68.2	2.8	13.7	10.4	799	1,477	67.6	2.3	14.8	7.9	1,496	66.3	13.3
California	5,973	19,329	81.2	0.6	26.4	2.2	5,111	17,546	78.6	0.7	26.4	2.2	18,695	76.2	23.4
Colorado	628	1,934	85.9	1.7	28.7	6.7	702	2,091	83.2	1.6	27.0	5.8	2,107	84.4	27.0
Connecticut	623	1,913	84.7	1.8	33.5	6.0	533	2,145	80.6	1.8	27.5	6.1	2,199	79.2	27.2
Delaware	85	313	82.0	5.0	31.5	15.6	529	418	80.7	1.8	19.4	7.5	428	77.5	21.4
D.C.	170	386	77.9	5.1	40.5	11.5	545	392	72.9	2.3	35.2	5.2	409	73.1	33.3
Florida	2,131	7,237	79.3	1.1	20.6	4.3	3,106	8,361	77.9	0.9	19.8	3.3	2,927	74.4	18.3
Georgia	1,095	3,486	74.3	1.9	21.3	6.1	640	3,898	71.1	2.1	18.2	7.1	4,023	70.9	19.3
Hawaii	76	415	86.7	3.6	19.8	18.4	485	687	82.3	1.6	23.9	6.3	710	80.1	22.9
Idaho	187	578	86.8	3.0	26.1	13.1	780	582	77.3	1.8	17.1	7.3	601	79.7	17.7
Illinois	2,247	7,374	78.3	1.1	20.7	4.3	2,435	7,063	77.2	1.0	21.1	3.5	7,294	76.2	21.0
Indiana	989	3,106	82.0	1.6	22.2	6.3	677	3,554	78.0	1.8	13.8	8.6	3,489	75.6	15.6
Iowa	592	1,687	83.7	2.0	25.0	7.9	785	1,786	83.4	1.4	17.1	7.1	1,777	80.1	16.9
Kansas	643	1,975	83.5	1.9	18.8	8.7	755	1,525	82.2	1.5	22.3	6.1	1,566	81.3	21.1
Kentucky	628	2,066	68.8	2.8	15.4	9.6	664	2,253	64.7	2.5	14.9	8.1	2,334	64.6	13.6
Louisiana	1,040	3,519	75.0	1.8	18.5	6.6	578	2,565	70.9	2.3	16.6	7.9	2,537	68.3	16.1
Maine	203	591	79.6	3.9	19.5	15.6	581	789	76.9	1.9	18.5	7.2	796	78.8	18.8
Maryland	802	2,675	81.7	1.7	30.5	5.4	579	3,034	80.7	1.7	27.4	5.7	3,123	78.4	26.5
Massachusetts	1,380	4,442	82.4	1.3	28.0	4.5	2,257	3,839	80.7	0.9	28.1	2.8	3,962	80.0	27.2
Michigan	1,647	5,172	81.9	1.2	21.1	5.0	2,416	5,748	77.0	1.0	17.3	3.9	5,843	76.8	17.4
Minnesota	1,000	3,153	85.1	1.4	24.8	5.8	620	2,688	85.5	1.4	21.5	6.6	2,771	82.4	21.8
Mississippi	166	513	72.7	5.1	12.0	22.3	762	1,515	67.7	2.3	15.6	7.6	727	64.3	14.7
Missouri	891	2,748	83.5	1.6	26.5	5.9	644	3,297	75.9	1.9	21.6	6.5	3,292	73.9	17.8
Montana	437	1,326	80.2	2.5	20.8	10.0	791	497	83.6	1.5	21.1	6.4	508	81.0	19.8
Nebraska	.	.	.	.	.	.	758	1,016	82.2	1.5	19.7	6.4	996	81.8	18.9
Nevada	155	565	83.1	3.5	14.2	19.3	702	723	84.0	1.5	17.2	7.7	790	78.8	15.3
New Hampshire	49	196	82.1	6.2	33.4	18.8	433	705	82.2	1.8	23.5	6.8	714	82.2	24.4
New Jersey	1,627	6,081	82.0	1.1	28.8	3.8	2,380	5,044	79.4	0.9	25.7	2.9	5,166	76.7	24.9
New Mexico	84	243	81.2	5.8	24.4	21.1	808	886	74.6	2.0	20.6	6.6	923	75.1	20.4
New York	3,325	10,190	78.0	1.0	24.7	3.2	4,411	11,501	76.7	0.7	22.8	2.4	11,819	74.8	23.1
North Carolina	1,274	4,350	68.2	1.9	15.5	6.6	2,388	4,124	71.3	1.1	18.3	3.6	4,253	70.0	17.4
North Dakota	.	.	.	.	.	.	770	402	81.1	1.5	22.2	5.9	397	76.7	18.1
Ohio	2,565	7,778	79.7	1.1	19.5	4.3	2,599	6,681	77.6	0.9	17.6	3.8	6,925	75.7	17.0
Oklahoma	908	2,797	77.8	1.9	19.6	7.2	718	2,004	75.4	1.9	17.1	7.3	1,995	74.6	17.8
Oregon	545	1,583	79.7	2.4	19.4	9.6	630	1,721	83.9	1.6	20.2	7.3	1,855	81.5	20.6
Pennsylvania	2,575	8,423	76.9	1.1	16.0	4.7	2,578	8,057	76.8	0.9	18.6	3.5	7,873	74.7	17.9
Rhode Island	156	580	79.2	4.0	27.8	12.5	496	643	72.7	2.2	20.2	7.3	659	72.0	21.3
South Carolina	377	1,192	80.1	2.7	23.0	9.9	757	2,212	69.8	2.0	16.6	6.7	2,168	68.3	16.6
South Dakota	194	595	79.1	3.9	13.8	19.2	806	433	78.3	1.6	18.4	6.4	431	77.1	17.2
Tennessee	1,103	3,598	73.3	1.9	19.8	6.3	716	3,123	65.4	2.3	15.7	7.4	3,139	67.1	16.0
Texas	3,426	10,970	73.3	1.1	20.0	3.6	3,056	9,630	74.3	1.1	21.7	3.4	10,311	72.1	20.3
Utah	315	1,002	88.4	2.1	25.9	10.0	639	881	88.2	1.3	24.2	6.4	897	85.1	22.3
Vermont	194	634	84.0	3.2	24.9	12.9	491	342	81.8	1.8	26.7	6.3	357	80.8	24.3
Virginia	1,350	4,247	74.1	1.7	25.9	4.8	854	3,840	74.3	1.8	27.3	4.9	3,975	75.2	24.5
Washington	727	2,154	86.1	1.6	29.1	6.3	725	2,932	88.2	1.2	24.1	6.0	3,126	83.8	22.9
West Virginia	197	653	61.5	5.8	9.5	22.6	708	1,192	68.0	2.2	11.1	9.3	1,172	66.0	12.3
Wisconsin	1,495	4,477	80.4	1.4	17.8	6.0	846	3,025	81.1	1.5	18.9	6.6	3,094	78.6	17.7
Wyoming	157	473	89.1	3.0	19.5	17.5	522	275	85.6	1.6	21.9	7.5	278	83.0	18.8
Average CV	NA	NA	NA	2.5	NA	9.8	NA	NA	NA	1.6	NA	6.1	NA	NA	NA

* Coefficient of sampling error. The census has negligible sampling error.

Note: Nebraska and North Dakota are not sampled in the NHIS. Population estimates from the NHIS are presented for comparative purposes only (they are not ratio-adjusted and are inaccurate for many states). CPS population estimates are ratio-adjusted to projected 1989 population based on 1980 census.

Source: 1990 census: Unpublished tabulations from the U.S. Bureau of the Census. 1990 NHIS: Author's tabulations from public use tapes. 1989 CPS: Statistical Abstract of the United States, 1991, Table 227. Washington, DC: U.S. Government Printing Office.

TABLE 2. Rate of Work Disability per Thousand People Aged 16 to 64 in 1980 and 1990 and Percent Change, by Severity and State

	With a work disability						Nonsevere work disability						Severe work disability					
	1980		1990				1980		1990				1980		1990			
	Rate per 1,000	Rank	Rate per 1,000	Rank	Change (%)	Rank	Rate per 1,000	Rank	Rate per 1,000	Rank	Change (%)	Rank	Rate per 1,000	Rank	Rate per 1,000	Rank	Change (%)	Rank
United States	85.2	—	81.5	—	-4.3	—	41.6	—	39.6	—	-4.7	—	43.6	—	41.9	—	-3.9	—
State																		
West Virginia	123.4	2	126.2	1	2.3	18	44.2	22	42.5	21	-3.7	27	79.2	1	83.7	1	5.7	16
Kentucky	113.9	4	114.3	2	0.4	21	45.5	16	41.5	26	-8.7	39	68.4	4	72.8	2	6.4	15
Arkansas	127.3	1	111.7	3	-12.2	48	54.0	2	45.9	9	-14.9	49	73.3	2	65.8	4	-10.2	43
Mississippi	117.6	3	109.8	4	-6.6	38	47.0	9	39.0	35	-16.9	51	70.6	3	70.8	3	0.3	26
Louisiana	95.6	15	102.9	5	7.6	8	41.2	35	39.0	38	-5.6	32	54.4	9	64.0	5	17.6	5
Oklahoma	107.6	5	101.6	6	-5.6	35	53.4	3	51.4	6	-3.8	28	54.1	10	50.2	9	-7.4	38
Maine	97.5	14	101.5	7	4.2	12	47.9	8	53.0	3	10.7	2	49.6	14	48.5	10	-2.1	29
Oregon	98.5	11	100.1	8	1.6	20	58.4	1	59.4	1	1.7	18	40.1	26	40.7	24	1.5	24
Tennessee	103.7	7	97.3	9	-6.2	36	43.2	26	39.0	36	-9.7	43	60.6	6	58.4	7	-3.6	31
Montana	81.4	28	97.0	10	19.3	2	49.0	6	51.7	5	5.5	6	32.4	37	45.3	16	40.1	1
Alabama	105.9	6	96.8	11	-8.6	42	43.6	23	37.7	43	-13.7	48	62.2	5	59.1	6	-5.0	34
South Carolina	98.1	12	91.1	12	-7.2	40	42.3	31	37.8	42	-10.6	45	55.9	8	53.3	8	-4.6	33
Washington	87.6	20	90.9	13	3.7	14	51.1	5	51.9	4	1.6	19	36.5	31	39.0	25	6.8	14
Michigan	92.8	16	90.4	14	-2.5	29	46.9	10	43.9	14	-6.5	34	45.8	17	46.6	15	1.6	23
Idaho	87.4	21	90.4	15	3.4	15	52.1	4	53.1	2	1.9	17	35.3	34	37.3	30	5.7	17
Ohio	88.0	19	90.1	16	2.4	17	42.5	29	42.4	22	-0.3	22	45.6	18	47.8	12	4.9	18
Georgia	103.6	8	88.4	17	-14.6	50	45.6	15	40.0	33	-12.3	47	58.0	7	48.5	11	-16.4	48
New Mexico	81.7	27	88.3	18	8.1	7	38.4	42	41.5	28	5.3	8	42.3	23	46.8	14	10.8	11
North Carolina	97.5	13	87.3	19	-10.4	45	44.6	19	39.8	34	-10.7	46	52.9	12	47.5	13	-10.1	42
Florida	99.3	9	86.6	20	-12.8	49	45.3	17	42.7	19	-5.7	33	54.0	11	43.9	19	-18.8	51
Rhode Island	86.3	22	85.8	21	-0.6	23	41.8	33	42.9	18	2.6	12	44.5	20	42.9	21	-3.6	30
Missouri	91.3	17	85.4	22	-6.5	37	45.1	18	41.5	27	8.0	38	46.2	16	43.9	20	-5.1	35
D.C.	98.8	10	84.0	23	-15.0	51	46.0	13	39.0	37	-15.4	50	52.8	13	45.1	17	-14.6	46
Nevada	78.0	32	83.4	24	7.0	9	46.7	12	47.8	7	2.3	16	31.3	39	35.7	32	14.0	7
Arizona	90.7	18	83.1	25	-8.4	41	46.0	14	41.8	25	-9.1	40	44.8	19	41.4	22	-7.6	39
Pennsylvania	84.7	24	82.6	26	-2.5	28	38.2	44	38.2	39	0.0	21	46.5	15	44.4	18	-4.6	32
Indiana	79.8	30	79.0	27	-1.0	24	42.3	30	40.3	32	-4.8	31	37.5	29	38.7	26	3.3	21
Vermont	85.1	23	79.0	28	-7.2	39	43.6	24	44.7	12	2.4	15	41.5	24	34.3	35	-17.3	50
Colorado	72.3	42	78.4	29	8.3	5	43.6	25	45.8	10	5.1	9	28.7	43	32.5	38	13.3	8
South Dakota	75.6	36	78.1	30	3.4	16	46.9	11	45.8	11	-2.3	25	28.7	44	32.3	39	12.7	9
Delaware	79.1	31	77.4	31	-2.1	27	41.0	36	42.0	24	2.4	14	38.1	28	35.4	33	-7.0	37
Texas	76.3	34	76.0	32	-0.4	22	39.7	41	37.9	41	-4.6	30	36.7	30	38.1	28	4.0	20
Iowa	72.4	41	75.8	33	4.8	11	42.7	28	43.8	15	2.5	13	29.6	40	32.0	40	8.0	12
Virginia	84.4	25	75.4	34	-10.6	46	40.1	39	37.0	45	-7.8	37	44.3	21	38.5	27	-13.1	45
New York	76.8	33	74.3	35	-3.2	31	33.2	50	33.3	50	0.3	20	43.6	22	41.0	23	-5.9	36
California	81.9	26	74.2	36	-9.5	43	40.5	38	36.7	46	-9.3	42	41.5	25	37.4	29	-9.7	41
Minnesota	70.4	43	73.9	37	4.9	10	44.4	21	47.4	8	6.6	4	26.0	47	26.5	49	2.0	22
Wisconsin	67.6	46	73.2	38	8.2	6	38.4	43	40.4	30	5.4	7	29.3	41	32.8	36	11.9	10
Utah	75.4	37	72.9	39	-3.3	32	48.1	7	44.5	13	-7.6	36	27.3	46	28.5	48	4.3	19
Wyoming	61.4	49	72.7	40	18.4	3	39.8	40	42.7	20	7.3	3	21.6	50	30.1	44	38.9	2
New Hampshire	75.1	38	72.7	41	-3.2	30	41.9	32	43.5	16	3.7	10	33.1	36	29.2	46	-11.9	44
Massachusetts	72.9	39	72.0	42	-1.2	25	36.8	46	36.2	47	-1.6	24	36.1	32	35.8	31	-0.8	28
Kansas	76.1	35	72.0	43	-5.4	34	44.6	20	40.5	29	-9.2	41	31.5	38	31.5	41	-0.1	27
Nebraska	70.1	44	71.4	44	1.8	19	42.8	27	42.3	23	-1.4	23	27.3	45	29.2	47	6.9	13
Maryland	80.0	29	70.5	45	-11.9	47	41.0	37	37.9	40	-7.5	35	39.0	27	32.6	37	-16.5	49
North Dakota	67.0	47	69.7	46	4.0	13	41.8	34	40.3	31	-3.5	26	25.2	49	29.3	45	16.4	6
Illinois	72.6	40	68.9	47	-5.0	33	37.4	45	33.6	49	-10.3	44	35.1	35	35.3	34	0.6	25
Alaska	54.0	51	66.3	48	22.8	1	35.7	48	43.2	17	20.8	1	18.3	51	23.1	51	26.7	3
Hawaii	59.2	50	65.9	49	11.4	4	33.7	49	35.7	48	6.1	5	25.5	48	30.2	43	18.4	4
Connecticut	65.1	48	63.8	50	-1.9	26	36.1	47	37.3	44	3.3	11	29.0	42	26.5	50	-8.4	40
New Jersey	68.6	45	61.8	51	-10.0	44	32.7	51	31.3	51	-4.1	29	36.0	33	30.5	42	-15.3	47

Source: 1980 census: Bowe, F. (1984). U.S. Census and Disabled Adults: The 50 States and the District of Columbia. (1250/2500/8-84). Arkansas Rehabilitation Research and Training Center, University of Arkansas, and Arkansas Rehabilitation Services and U.S. Bureau of the Census (1983). 1980 Census of the Population: General Social and Economic Characteristics. (PC80-1-C). Washington, DC: U.S. Government Printing Office. 1990 census : Unpublished tabulations from the U.S. Bureau of the Census.

TABLE 3. Rate of Difficulty in Mobility or Self-care per Thousand People Aged 16 and Older, by Age Group and State: 1990 Census

	Ages 16 and over						Ages 16-64						Ages 65 and over					
	Mobility or Self Care		Self Care		Mobility		Mobility or Self Care		Self Care		Mobility		Mobility or Self Care		Self Care		Mobility	
	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank
United States	70.4	—	47.7	—	43.2	—	45.9	—	34.3	—	21.9	—	201.1	—	119.3	—	156.0	—
State																		
Mississippi	104.1	1	71.9	1	65.2	2	70.1	2	52.8	2	34.4	2	276.9	1	169.3	1	221.5	1
Alabama	95.3	2	65.0	3	59.9	4	61.8	4	46.5	5	29.8	5	264.7	2	158.5	2	212.1	2
West Virginia	94.7	3	58.1	8	67.8	1	58.4	6	38.5	9	35.6	1	253.7	3	143.8	5	208.5	3
District of Columbia	94.4	4	71.8	2	47.5	12	70.8	1	58.8	1	25.9	9	228.6	11	145.9	4	170.2	13
Arkansas	89.5	5	58.5	7	59.5	5	54.6	8	38.9	8	29.0	6	240.6	7	143.3	7	191.4	8
Louisiana	89.5	6	62.5	4	54.2	7	61.9	3	47.2	4	29.9	4	251.3	4	152.6	3	197.5	6
South Carolina	87.0	7	61.5	5	50.3	8	61.3	5	47.6	3	27.0	8	234.5	9	140.8	8	184.3	10
Kentucky	85.8	8	53.0	12	60.5	3	54.5	9	36.7	14	32.6	3	250.1	5	138.8	9	207.0	4
New York	81.6	9	58.6	6	46.5	15	57.0	7	44.5	6	25.0	10	209.5	15	131.7	12	158.3	17
Florida	79.9	10	54.1	9	48.8	11	50.2	12	37.1	13	24.0	14	181.1	30	111.8	28	133.2	34
Tennessee	79.7	11	51.2	13	54.3	6	49.7	13	34.8	16	27.5	7	239.6	8	138.3	10	197.1	7
North Carolina	78.2	12	53.0	11	48.9	10	50.6	11	38.0	11	24.2	13	232.4	10	136.9	11	186.3	9
Georgia	78.2	13	53.3	10	47.0	13	53.0	10	39.9	7	24.5	12	246.8	6	143.5	6	198.4	5
Oklahoma	73.9	14	47.3	19	49.8	9	44.6	21	31.2	25	24.5	11	215.4	13	125.1	14	171.9	11
Pennsylvania	73.3	15	48.0	16	46.5	14	43.5	23	31.6	22	21.9	18	201.9	18	118.9	18	152.8	22
New Jersey	72.2	16	50.6	14	41.2	21	47.6	15	37.2	12	20.3	25	198.0	22	119.1	17	148.2	24
Missouri	71.9	17	46.9	20	46.1	16	43.2	25	31.1	26	21.9	19	207.6	16	121.6	16	160.7	15
Ohio	70.0	18	45.1	24	44.9	17	44.4	22	31.6	24	23.0	16	203.1	17	115.5	23	158.1	18
Illinois	69.9	19	47.7	17	41.8	20	45.5	19	34.7	17	20.8	23	201.4	20	117.7	19	154.8	20
Rhode Island	69.3	20	45.4	23	43.1	19	41.5	28	30.1	29	21.1	22	196.0	24	114.8	25	143.1	29
Michigan	69.2	21	46.0	22	43.6	18	45.7	18	33.3	20	23.1	15	201.7	19	117.4	20	158.5	16
California	67.8	22	48.5	15	38.2	30	48.7	14	38.0	10	21.3	21	190.0	25	115.9	22	147.2	25
Texas	67.5	23	46.7	21	41.0	22	45.1	20	34.0	19	21.3	20	215.8	12	131.0	13	171.3	12
Maryland	67.3	24	47.4	18	37.2	32	46.4	16	36.6	15	18.5	32	200.7	21	116.8	21	156.5	19
New Mexico	66.3	25	44.6	25	40.8	23	46.3	17	34.1	18	22.5	17	184.2	29	106.6	30	149.2	23
Indiana	66.0	26	43.3	29	40.7	24	41.7	26	30.5	28	19.9	27	197.1	23	111.9	27	152.8	21
Delaware	64.8	27	44.2	26	38.8	29	43.3	24	33.1	21	19.9	26	185.5	28	106.5	31	144.6	28
Virginia	64.6	28	43.4	28	39.8	27	41.5	27	30.8	27	19.5	30	210.6	14	123.3	15	168.6	14
Massachusetts	62.4	29	40.8	31	40.3	26	37.7	32	26.9	33	19.8	29	189.6	26	112.2	26	146.1	26
Arizona	62.2	30	40.6	32	39.1	28	41.2	29	29.7	30	20.4	24	165.0	43	93.4	42	130.3	39
Connecticut	61.8	31	42.9	30	36.0	34	37.3	33	28.8	31	16.4	37	187.3	27	115.1	24	136.7	31
Hawaii	60.9	32	43.7	27	33.1	39	40.2	30	31.6	23	16.4	36	175.7	32	111.4	29	126.3	42
Maine	59.0	33	36.2	36	40.6	25	35.0	34	23.7	35	19.9	28	180.3	31	98.9	33	144.9	27
Iowa	58.4	34	37.8	35	36.7	33	31.7	38	22.8	36	15.7	40	173.5	33	102.6	32	127.6	41
Kansas	58.1	35	38.3	33	36.0	35	33.9	35	25.5	34	15.6	41	172.0	34	98.5	34	131.8	35
Oregon	56.5	36	35.6	37	38.1	31	32.8	36	22.8	37	18.1	33	169.1	37	96.3	37	133.3	33
Nevada	56.5	37	38.0	34	33.0	40	39.2	31	28.7	32	18.5	31	166.4	39	96.7	36	125.2	43
Wisconsin	53.5	38	34.5	38	34.7	36	31.3	40	22.1	39	16.9	35	165.3	41	96.9	35	124.8	44
Washington	52.2	39	32.8	39	34.6	37	32.0	37	21.9	40	17.5	34	165.7	40	94.0	41	131.2	36
Nebraska	50.6	40	32.7	40	32.2	43	29.1	42	21.3	41	14.3	46	150.3	47	85.5	45	115.5	49
Colorado	49.4	41	31.6	42	31.4	44	31.6	39	22.5	38	16.2	39	171.0	35	94.2	40	135.5	32
Minnesota	49.0	42	31.6	41	31.2	46	27.8	44	20.1	43	14.1	47	165.1	42	94.8	39	124.5	45
South Dakota	48.9	43	30.1	43	32.5	42	29.3	41	20.9	42	15.5	43	133.0	51	69.4	51	105.2	50
Montana	48.8	44	29.7	44	33.8	38	28.7	43	19.8	44	16.3	38	147.2	49	78.4	49	119.3	48
New Hampshire	47.1	45	29.5	45	30.8	47	27.6	45	18.9	45	14.7	44	167.9	38	95.1	38	130.8	38
Idaho	46.3	46	27.6	47	32.9	41	26.7	47	17.8	47	15.6	42	148.1	48	78.5	48	122.8	46
Utah	45.4	47	28.2	46	29.6	48	27.1	46	18.9	46	13.9	48	170.9	36	92.2	43	137.3	30
North Dakota	43.7	48	26.7	48	29.2	49	23.6	50	15.9	51	12.6	50	134.8	50	75.4	50	104.5	51
Vermont	42.4	49	25.5	49	31.3	45	23.9	49	16.0	49	14.5	45	152.0	46	82.0	47	131.0	37
Wyoming	40.7	50	25.1	50	27.0	50	23.0	51	16.0	50	12.0	51	152.3	45	82.1	46	121.3	47
Alaska	32.7	51	21.8	51	19.6	51	25.0	48	17.6	48	12.8	49	156.9	44	90.5	44	129.8	40

Source: 1990 census: Unpublished tabulations from the U.S. Bureau of the Census.

TABLE 4. Rate of Work Disability per Thousand People Aged 16-64, by Severity of Disability and State: 1990 CPS

	Total Population	With a work disability			Nonsevere work disability			Severe work disability		
	(1,000s)	Rate	CV	Rank	Rate	CV	Rank	Rate	CV	Rank
United States	158,911	81.3	1.3	—	31.7	2.2	—	49.6	1.7	—
State										
Louisiana	2,686	120.2	9.4	1	37.0	17.7	18	83.2	11.5	2
West Virginia	1,165	120.2	9.0	2	37.5	16.8	17	82.6	11.1	3
Alabama	2,593	113.1	9.3	3	27.2	19.8	40	85.9	10.8	1
Mississippi	1,605	112.0	9.0	4	42.8	15.1	7	69.2	11.7	6
Tennessee	3,150	111.9	8.9	5	34.6	16.8	24	77.3	11.0	4
Michigan	5,993	106.3	5.0	6	44.4	8.0	6	61.9	6.7	7
Kentucky	2,387	104.8	9.7	7	33.0	18.0	30	71.8	11.9	5
South Carolina	2,201	102.4	9.0	8	40.5	14.7	12	61.9	11.8	8
Montana	510	92.9	10.3	9	47.9	14.6	3	45.0	15.1	25
Arkansas	1,453	91.0	10.6	10	39.6	16.5	13	51.4	14.4	16
Oklahoma	1,989	90.8	10.5	11	41.4	16.0	9	49.4	14.6	20
North Carolina	4,236	88.3	5.4	12	33.1	9.2	29	55.2	7.0	12
Georgia	4,070	87.9	10.6	13	35.8	17.1	21	52.2	14.0	14
Maine	803	87.3	11.0	14	27.4	20.2	39	60.0	13.4	10
New Mexico	942	85.4	10.8	15	41.1	15.9	11	44.3	15.3	27
Washington	3,166	85.1	10.8	16	41.7	15.7	8	43.3	15.4	30
Rhode Island	632	82.7	12.3	17	33.5	19.9	27	49.2	16.3	21
Idaho	622	82.6	10.7	18	45.2	14.8	4	37.5	16.3	36
Pennsylvania	7,667	81.8	5.7	19	29.8	9.8	36	52.0	7.3	15
Delaware	453	81.4	11.9	20	32.6	19.4	31	48.8	15.7	22
D.C.	380	81.3	13.1	21	20.3	26.9	49	61.0	15.2	9
Massachusetts	3,905	80.8	6.0	22	25.8	10.8	42	54.9	7.3	13
Virginia	4,053	80.7	9.9	23	32.5	15.9	32	48.2	13.0	23
Ohio	6,886	79.9	5.9	24	30.0	9.8	35	50.0	7.5	18
Wyoming	306	79.7	12.9	25	48.7	16.7	1	31.1	21.1	46
Oregon	1,814	79.7	12.2	26	48.5	15.9	2	31.3	20.0	45
Texas	10,800	79.6	5.8	27	35.5	8.9	22	44.0	7.9	28
New York	11,540	79.3	4.5	28	23.3	8.5	47	56.0	5.4	11
South Dakota	426	77.9	10.5	29	38.2	15.3	14	39.7	15.0	34
Florida	8,042	77.8	5.7	30	33.8	8.9	26	44.0	7.8	29
Wisconsin	3,006	77.6	11.0	31	45.2	14.7	5	32.4	17.4	43
California	19,110	77.4	4.4	32	28.0	7.5	37	49.4	5.6	19
Illinois	7,571	76.5	6.0	33	25.6	10.7	43	51.0	7.5	17
Missouri	3,278	76.0	12.0	34	33.5	18.5	28	42.5	16.3	31
Colorado	2,084	75.1	12.5	35	30.6	20.0	33	44.5	16.5	26
Arizona	2,174	73.2	12.4	36	36.1	18.0	20	37.2	17.7	37
Utah	955	73.2	12.3	37	35.3	18.1	23	37.8	17.5	35
Hawaii	727	72.5	12.3	38	25.0	21.6	44	47.6	15.4	24
North Dakota	396	71.7	11.4	39	37.9	16.0	15	33.8	16.9	42
Kansas	1,547	69.3	11.9	40	37.7	16.4	16	31.6	18.0	44
Minnesota	2,752	67.5	12.7	41	41.3	16.5	10	26.2	20.9	49
New Hampshire	734	65.8	14.0	42	36.8	19.1	19	29.0	21.6	48
Maryland	3,129	64.9	13.2	43	23.3	22.4	46	41.6	16.6	33
Iowa	1,761	64.9	12.4	44	34.0	17.4	25	30.9	18.3	47
Vermont	371	64.8	14.0	45	27.9	21.8	38	36.9	18.8	38
Indiana	3,550	62.6	13.3	46	26.0	21.0	41	36.5	17.7	40
Nevada	769	61.7	13.3	47	24.8	21.4	45	36.9	17.4	39
Nebraska	1,005	56.6	13.0	48	20.1	22.2	50	36.4	16.4	41
New Jersey	5,083	56.1	7.1	49	14.2	14.3	51	41.9	8.3	32
Alaska	336	53.4	13.0	50	30.1	17.6	34	23.3	20.1	50
Connecticut	2,100	44.8	17.5	51	22.2	25.1	48	22.5	24.9	51
Average CV	NA	NA	10.3	NA	NA	16.4	NA	NA	14.1	NA

Note: Survey estimates are considerably less precise than 1990 census estimates.
Source: Author's tabulations from public use tapes.

TABLE 5. Rate of Work Disability per Thousand People Aged 18-64, by Severity of Disability and State: 1988-90 NHIS (Three-year average)

	Sample	With a work disability			Nonsevere work disability			Severe work disability		
	size	Rate	CV	Rank	Rate	CV	Rank	Rate	CV	Rank
United States	215,377	95.2	1.0	—	43.3	1.5	—	51.8	1.4	—
State										
Mississippi	758	193.0	11.1	1	94.9	16.8	1	98.1	16.5	2
West Virginia	830	153.7	11.8	2	43.8	23.5	20	110.0	14.3	1
Kentucky	2,816	149.0	6.6	3	56.6	11.3	13	92.4	8.7	3
Alabama	4,029	145.1	5.6	4	61.2	9.0	7	83.8	7.6	4
Tennessee	5,038	128.3	5.5	5	59.3	8.3	8	69.1	7.7	7
Oklahoma	3,722	123.2	6.5	6	61.6	9.5	5	61.6	9.5	12
Oregon	2,247	118.9	8.6	8	50.2	13.8	17	68.7	11.7	8
Alaska	269	118.9	15.0	7	73.5	19.6	2	45.4	25.3	35
Louisiana	4,483	118.3	5.7	9	53.3	8.8	14	65.1	8.0	9
Montana	1,959	115.5	9.3	10	40.1	16.5	32	75.4	11.8	6
Maine	937	112.9	13.7	11	53.3	20.5	15	59.6	19.3	14
Michigan	7,336	111.1	4.9	12	57.6	7.0	11	53.5	7.2	20
Arkansas	2,556	110.0	8.1	13	28.8	16.5	45	81.2	9.6	5
Utah	1,604	106.9	10.7	14	71.5	13.3	3	35.4	19.3	48
Wisconsin	6,507	104.5	5.5	15	61.3	7.3	6	43.1	8.8	38
North Carolina	5,573	104.4	5.7	16	42.9	9.2	24	61.5	7.6	13
New Mexico	435	103.6	21.7	17	52.1 *	31.5	16	51.5 *	31.7	23
Rhode Island	658	103.1	16.2	18	57.6	22.3	12	45.5	25.2	34
Ohio	11,183	103.0	4.2	19	49.8	6.2	18	53.2	5.9	21
Minnesota	4,661	102.8	6.5	20	62.9	8.4	4	40.0	10.7	40
Nevada	762	102.5	14.2	21	43.5	22.6	22	59.0	19.2	15
Arizona	3,244	101.7	7.6	22	43.4	12.0	23	58.3	10.2	17
Hawaii	433	99.4	16.2	23	40.5	26.1	30	58.9	21.5	16
Kansas	2,667	98.1	8.8	24	59.2	11.5	9	38.8	14.4	42
Texas	15,649	94.6	3.6	25	42.6	5.5	25	52.0	5.0	22
Vermont	839	94.6	15.8	26	58.9	20.5	10	35.7	26.6	45
Washington	3,160	92.6	8.3	27	48.3	11.8	19	44.4	12.3	37
District of Columbia	683	91.2	19.1	28	28.7 *	35.1	47	62.5	23.4	11
Florida	8,989	91.0	4.8	29	40.5	7.4	31	50.5	6.6	24
Indiana	4,358	89.7	7.1	30	41.3	10.7	28	48.4	9.8	27
South Carolina	1,559	89.3	12.1	31	41.5	18.2	27	47.8	16.9	28
Georgia	4,915	88.8	6.7	32	25.8	12.8	48	63.0	8.1	10
Massachusetts	6,017	88.7	6.2	33	39.5	9.5	33	49.2	8.4	25
California	27,038	88.4	2.9	34	41.8	4.3	26	46.6	4.1	30
Colorado	2,691	86.4	8.9	35	37.4	13.9	34	49.0	12.1	26
Delaware	372	86.3	24.0	36	28.9 *	42.8	44	57.4	29.9	18
Illinois	9,969	83.1	4.9	37	36.7	7.5	36	46.4	6.7	32
Virginia	6,139	82.8	6.2	38	36.1	9.6	37	46.6	8.4	31
New York	14,497	82.7	4.0	39	28.8	7.0	46	53.9	5.1	19
Pennsylvania	11,129	82.5	4.7	40	35.6	7.3	38	46.9	6.4	29
Idaho	930	82.0	16.9	41	43.8	23.6	21	38.3	25.3	43
Iowa	2,399	81.0	10.4	42	35.3	16.2	39	45.7	14.1	33
South Dakota	809	80.0	18.0	43	34.9	27.9	40	45.1	24.4	36
Missouri	3,997	76.8	8.2	44	41.2	11.3	29	35.6	12.2	46
Maryland	3,690	73.1	8.4	45	34.0	12.5	41	39.1	11.6	41
New Hampshire	271	70.2 *	30.8	46	30.0 *	48.1	43	40.2 *	41.3	39
Connecticut	2,912	69.4	10.0	47	37.4	13.8	35	32.0	15.0	49
New Jersey	7,025	67.1	6.2	48	31.5	9.2	42	35.6	8.7	47
Wyoming	633	58.8	24.5	49	22.8 *	40.0	49	36.0 *	31.7	44
Average CV	NA	NA	10.2	NA	NA	15.9	NA	NA	14.4	NA

*Estimate has low statistical precision.

Note: Survey estimates are considerably less precise than 1990 census estimates. Nebraska and North Dakota are not sampled.

Source: Author's tabulations from public use tapes.

TABLE 6. Rate of Need for Assistance in IADL/ADL per Thousand People Aged 16 and Older, by State: 1988-90 NHIS (Three-year Average)

	Sample	IADL or ADL			IADL only			ADL		
	size	Rate	CV	Rank	Rate	CV	Rank	Rate	CV	Rank
United States	270,109	40.4	1.4	—	26.9	1.7	—	13.5	2.4	—
State										
West Virginia	1,112	71.2	15.8	1	47.6	19.5	3	23.6	28.1	1
Kentucky	3,643	66.8	9.1	2	48.9	10.8	2	17.9	18.1	6
Rhode Island	878	66.1	18.2	3	56.3	19.8	1	9.8 *	48.6	38
Alabama	5,168	64.9	7.7	4	42.7	9.7	5	22.2	13.5	3
Arkansas	3,264	64.7	9.6	5	43.0	11.9	4	21.7	17.0	5
Maine	1,191	59.1	17.3	6	37.0	22.2	8	22.1	28.9	4
Oklahoma	4,848	54.4	8.9	7	38.1	10.8	6	16.3	16.6	10
Tennessee	6,324	53.3	7.9	8	35.5	9.8	9	17.8	14.0	7
Arizona	4,153	52.1	9.6	9	38.0	11.4	7	14.2	18.8	16
Mississippi	942	50.9	21.2	10	34.0	26.1	11	16.8 *	37.5	8
Michigan	9,074	50.3	6.8	11	35.4	8.1	10	15.0	12.6	13
Louisiana	5,590	46.1	8.6	12	33.8	10.1	12	12.3	17.0	28
Ohio	14,127	45.7	5.8	13	32.3	6.9	14	13.4	10.8	19
D.C.	852	45.3	25.1	14	33.0	29.6	13	12.4 *	48.8	26
North Carolina	7,223	44.9	7.9	15	30.7	9.7	15	14.1	14.4	17
Florida	11,627	44.6	6.2	16	28.1	7.9	21	16.5	10.3	9
Indiana	5,433	43.2	9.4	17	28.8	11.6	18	14.4	16.5	15
Montana	2,417	43.1	14.3	18	30.5	17.2	16	12.6	26.9	23
Texas	19,355	42.8	5.0	19	28.7	6.1	19	14.1	8.8	18
Massachusetts	7,844	42.2	8.0	20	29.7	9.6	17	12.6	14.9	24
Illinois	12,436	42.1	6.3	21	26.1	8.1	23	16.0	10.4	11
Delaware	477	40.5 *	31.9	22	28.7 *	38.1	20	11.8 *	59.9	31
Alaska	315	39.3	25.1	23	16.2 *	39.6	44	23.1 *	33.1	2
Pennsylvania	14,569	39.3	6.1	24	26.2	7.5	22	13.1	10.7	21
Virginia	7,443	38.8	8.4	25	23.2	11.0	28	15.6	13.4	12
Kansas	3,594	37.5	12.8	26	22.5	16.6	29	14.9	20.5	14
Oregon	2,885	35.7	14.6	27	24.9	17.6	24	10.8	26.9	37
Georgia	6,120	35.2	9.9	28	24.0	12.0	26	11.2	17.7	36
California	33,117	34.1	4.3	29	21.9	5.4	32	12.2	7.3	29
Wisconsin	8,292	33.9	8.9	30	22.3	11.1	30	11.5	15.5	35
New York	18,075	33.7	5.8	31	20.5	7.5	36	13.2	9.4	20
Missouri	4,920	33.4	11.5	32	24.2	13.5	25	9.2	22.1	39
South Carolina	1,974	33.3	18.1	33	20.8	23.1	35	12.5	29.9	25
Vermont	1,034	32.9	25.1	34	21.1 *	31.5	33	11.8 *	42.4	32
New Jersey	8,789	32.7	8.2	35	19.8	10.6	40	12.9	13.1	22
Washington	3,828	32.1	13.3	36	20.2	16.9	37	12.0	22.0	30
Idaho	1,120	32.0	25.4	37	23.4	29.8	27	8.6 *	49.5	42
Iowa	3,107	31.9	15.0	38	20.1	19.1	38	11.8	25.0	33
Minnesota	5,651	29.8	11.4	39	22.1	13.3	31	7.6	22.8	45
Connecticut	3,587	29.7	14.1	40	21.1	16.8	34	8.7	26.4	41
Maryland	4,429	27.7	12.8	41	19.3	15.3	41	8.4	23.4	44
Colorado	3,226	27.2	15.1	42	15.6	20.0	45	11.6	23.2	34
New Mexico	507	27.1 *	41.1	43	18.3 *	50.2	42	8.8 *	72.8	40
South Dakota	1,102	25.7	28.2	44	13.3 *	39.5	47	12.4 *	40.9	27
Wyoming	799	25.7 *	33.7	45	17.1 *	41.5	43	8.6 *	58.8	43
Utah	1,941	24.4	21.5	46	20.1	23.7	39	4.3 *	51.6	47
New Hampshire	308	17.1 *	60.8	47	14.4 *	66.3	46	2.8 *	151.3	49
Nevada	868	16.9 *	34.6	48	13.3 *	39.1	48	3.6 *	75.6	48
Hawaii	531	16.0 *	38.1	49	9.9 *	48.5	49	6.1 *	62.0	46
Averge CV	NA	NA	16.0	NA	NA	19.6	NA	NA	28.1	NA

*Estimate has low statistical precision.

Note: Survey estimates are considerably less precise than 1990 census estimates. Nebraska and North Dakota are not sampled.

Source: Author's tabulations from public use tapes.

TABLE 7. Rate of Activity Limitation per Thousand People of All Ages by Degree of Limitation and State: 1988-90 NHIS (Three-year Average)

	Sample size	With limitation in: Any activity Rate	CV	Rank	Nonmajor activity Rate	CV	Rank	Major activity Rate	CV	Rank
United States	358,870	137.2	0.6	—	44.2	1.2	—	92.9	0.8	—
State										
Mississippi	1,319	199.2	8.4	1	42.9	19.7	33	156.3	9.7	1
Alabama	7,025	196.4	3.6	2	55.2	7.3	8	141.2	4.3	3
West Virginia	1,422	196.0	7.9	3	45.6	17.8	24	150.4	9.2	2
Rhode Island	1,160	191.5	8.7	4	67.4	15.7	2	124.0	11.3	5
Kentucky	4,859	187.3	4.5	5	52.7	9.1	11	134.6	5.4	4
Oklahoma	6,431	184.5	3.9	6	63.1	7.2	4	121.5	5.0	7
Montana	3,203	175.0	5.8	7	66.4	10.0	3	108.6	7.6	11
Tennessee	8,256	173.9	3.6	8	50.6	7.2	14	123.2	4.4	6
South Dakota	1,498	164.5	8.9	9	91.4	12.5	1	73.0	14.1	48
Maine	1,521	163.7	8.7	10	52.1	16.5	12	111.6	10.9	9
D.C.	1,067	158.2	11.4	11	50.7	21.4	13	107.5	14.3	13
Alaska	460	158.1	9.9	12	44.2	19.9	31	114.0	11.9	8
Louisiana	7,817	156.4	3.8	13	45.2	7.4	26	111.2	4.6	10
North Carolina	9,361	155.5	3.5	14	50.0	6.6	16	105.5	4.4	15
Oregon	3,761	155.0	5.8	15	50.6	10.8	15	104.4	7.3	16
Michigan	12,031	153.1	3.2	16	44.6	6.3	30	108.4	3.9	12
Massachusetts	9,905	153.0	3.6	17	60.7	6.0	5	92.3	4.7	27
Arkansas	4,369	152.3	5.2	18	46.5	10.0	23	105.8	6.4	14
Florida	15,254	150.7	2.8	19	54.7	4.9	9	96.0	3.6	20
Kansas	4,781	148.6	5.3	20	53.1	9.3	10	95.5	6.8	21
Delaware	576	148.3	14.4	21	59.8	23.8	6	88.5	19.3	32
Arizona	5,558	147.3	4.7	22	47.3	8.8	20	100.0	5.9	18
Ohio	18,669	146.6	2.7	23	45.3	5.1	25	101.3	3.3	17
North Dakota	NA	145.7	NA	24	56.8	NA	7	88.8	NA	31
Wisconsin	11,069	142.2	3.6	25	47.9	6.5	19	94.2	4.5	25
South Carolina	2,656	140.6	7.3	26	45.2	13.5	27	95.4	9.0	22
Nebraska	NA	140.3	NA	27	45.2	NA	28	95.2	NA	23
Pennsylvania	18,527	138.5	2.8	28	49.3	4.9	18	89.2	3.5	29
Vermont	1,400	135.6	10.1	29	38.2	20.1	39	97.4	12.2	19
Washington	5,121	135.2	5.3	30	46.9	9.5	21	88.2	6.8	34
Colorado	4,345	134.0	5.6	31	49.4	9.6	17	84.5	7.2	37
Minnesota	7,784	132.3	4.4	32	37.3	8.7	41	95.0	5.3	24
Indiana	7,271	131.9	4.5	33	42.6	8.2	34	89.3	5.5	28
Nevada	1,099	127.2	10.7	34	39.9	20.1	37	87.3	13.2	35
Texas	26,662	126.4	2.4	35	33.6	4.8	46	92.8	2.8	26
Georgia	8,238	125.2	4.3	36	41.3	7.9	35	83.9	5.4	41
Maryland	5,723	124.5	5.1	37	44.7	8.8	29	79.8	6.5	44
California	44,648	124.4	1.9	38	40.4	3.5	36	84.0	2.3	39
Virginia	9,749	124.0	3.9	39	34.8	7.8	44	89.2	4.7	30
Illinois	16,705	121.9	3.1	40	33.4	6.2	48	88.5	3.7	33
Idaho	1,554	120.6	10.7	41	33.6	21.2	47	87.0	12.8	36
Iowa	4,146	118.9	6.5	42	39.4	11.8	38	79.5	8.1	45
New Jersey	11,240	118.7	3.6	43	43.9	6.2	32	74.9	4.7	47
New York	23,556	118.7	2.6	44	34.4	5.1	45	84.2	3.2	38
Missouri	6,482	118.6	5.1	45	37.7	9.5	40	80.9	6.3	43
Utah	3,120	115.6	7.5	46	31.7	15.0	49	84.0	9.0	40
New Mexico	739	115.5	15.9	47	36.8	29.4	42	78.6	19.7	46
New Hampshire	412	115.1	19.4	48	46.9 *	31.5	22	68.3	25.8	50
Hawaii	653	113.9	12.3	49	30.4	24.9	50	83.6	14.6	42
Connecticut	4,577	105.2	6.4	50	36.1	11.4	43	69.1	8.1	49
Wyoming	1,091	83.7	15.6	51	27.8	27.9	51	55.9	19.4	51
Average CV	NA	NA	6.5	NA	NA	12.2	NA	NA	8.2	NA

*Estimate has low statistical precision.

Note: Nebraska and North Dakota are not in sample and are imputed from Leroy (1991)—see text for citation.

Source: Author's tabulations from public use tapes.

TABLE 8. Number of People in Thousands by Age Group and State: 1990 Census

	All ages	Over 16	16-64	65+
United States	248,710	186,887	157,324	29,564
State				
Alabama	4,041	3,029	2,530	500
Alaska	550	364	343	21
Arizona	3,665	2,720	2,256	463
Arkansas	2,351	1,756	1,426	330
California	29,760	22,150	19,164	2,986
Colorado	3,294	2,446	2,134	311
Connecticut	3,287	2,554	2,137	417
Delaware	666	505	429	77
D.C.	607	484	411	72
Florida	12,938	10,102	7,810	2,292
Georgia	6,478	4,781	4,161	620
Hawaii	1,108	794	673	121
Idaho	1,007	714	599	115
Illinois	11,431	8,613	7,262	1,351
Indiana	5,544	4,160	3,510	650
Iowa	2,777	2,083	1,691	392
Kansas	2,478	1,814	1,495	318
Kentucky	3,685	2,763	2,321	442
Louisiana	4,220	3,022	2,582	439
Maine	1,228	927	773	154
Maryland	4,781	3,629	3,137	491
Massachusetts	6,016	4,712	3,945	767
Michigan	9,295	6,980	5,925	1,055
Minnesota	4,375	3,256	2,753	504
Mississippi	2,573	1,864	1,558	307
Missouri	5,117	3,843	3,172	671
Montana	799	584	485	99
Nebraska	1,578	1,155	950	205
Nevada	1,202	913	788	124
New Hampshire	1,109	843	726	117
New Jersey	7,730	6,015	5,030	985
New Mexico	1,515	1,084	928	157
New York	17,990	13,895	11,656	2,239
North Carolina	6,629	5,004	4,244	761
North Dakota	639	460	377	83
Ohio	10,847	8,182	6,861	1,321
Oklahoma	3,146	2,320	1,923	397
Oregon	2,842	2,156	1,781	375
Pennsylvania	11,882	9,204	7,474	1,729
Rhode Island	1,003	780	639	141
South Carolina	3,487	2,564	2,183	380
South Dakota	696	498	404	94
Tennessee	4,877	3,709	3,123	586
Texas	16,987	12,311	10,696	1,616
Utah	1,723	1,135	991	144
Vermont	563	428	366	62
Virginia	6,187	4,594	3,967	627
Washington	4,867	3,623	3,077	546
West VIrginia	1,793	1,385	1,127	258
Wisconsin	4,892	3,659	3,054	605
Wyoming	454	323	279	44

Source: 1990 census: Unpublished tabulations from the U.S. Bureau of the Census.
Total population counts.

APPENDIX

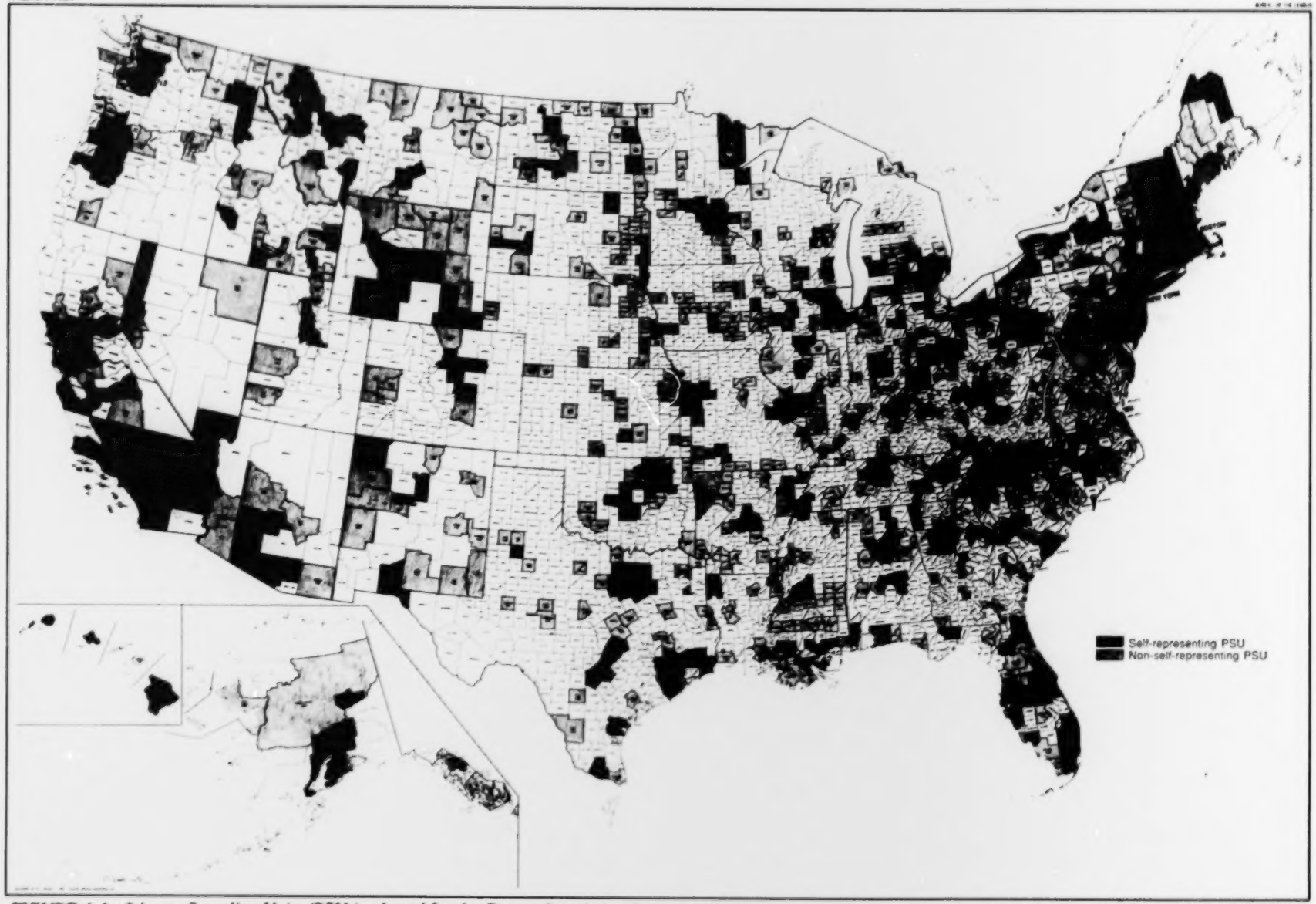

FIGURE A.1. Primary Sampling Units (PSUs) selected for the Current Population Survey, 1985-94

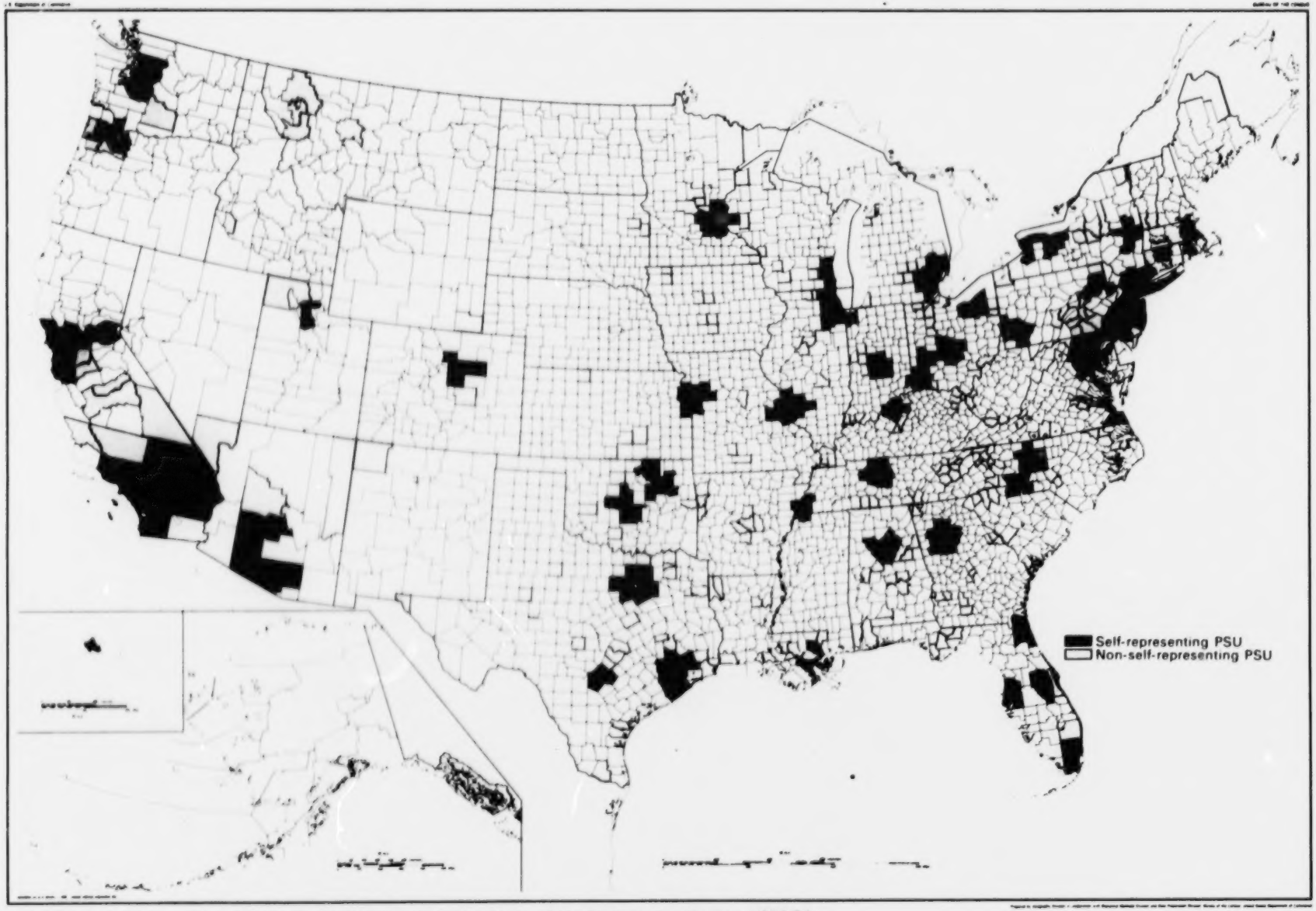

FIGURE A.2. Primary Sampling Units (PSUs) selected for the National Health Interview Survey, 1985-94

SAMPLING ERROR

Some of the information presented in this report is based on secondary analysis of National Health Interview Survey (NHIS) and Current Population Survey (CPS) public use data tapes. Both are continuing national household probability sample surveys using complex multi-stage probability sampling procedures. More detailed information on the sample design and collection and processing of the data can be found in annual reports from the NHIS titled *Current Estimates*, Appendix I (for example, see Adams and Benson, 1991) and in Yax (1991).

The coefficient of variation (also called the relative standard error) is a measure of sampling error of an estimate expressed as a percentage of the estimate.

For the NHIS and the CPS, curves computed for broad classes of estimates can be used to approximate the standard error of a particular estimate. These curves are of the form

$$SE(x) = \sqrt{ax^2 + bx}\ .$$

In the NHIS, the standard error parameters for population estimates were used for educational attainment and disability estimates. In 1990, a= -.0000143 and b=3,490. For the March 1990 CPS, standard error parameters for educational attainment are available (a=-.000019 and b=2,468). Parameters for employment characteristics were used for disability estimates (a= -.000019 and b=2,485), though the parameters are almost identical with those for education. In the CPS, sampling rates differ by state, necessitating applying adjustment factors to the variance curves provided for each state, as explained in Yax (1991).

For NHIS estimates based on three years of data, the standard error theoretically could be reduced by $1/\sqrt{3}$, but, since there is some covariance in the estimates owing to households being sampled from the same PSUs, the actual reduction is not as great. Actual reductions in standard errors obtained from other examples in which several years of sample data were combined (NCHS, 1991), indicate that the variance was reduced by only 80 percent of $1/\sqrt{3}$, and an adjustment was made according to the formula

$$b_{1988\text{-}90} = 1.25 * (3640 * 2 + 3490)/9$$
$$b_{1988} = b_{1989} = 3640$$
$$b_{1990} = 3490.$$

These estimates of sampling variability are obtained from variation within the overall sample and are at best approximate.

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